CITY OF TAMPA, FLORIDA

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS PROPOSAL, BID BOND, FORM OF NOTICE OF AWARD, AGREEMENT, PERFORMANCE BOND AND SPECIFICATIONS FOR

Contract 27-C-00004 Lantana-Poinsettia Stormwater Pumping Station Replacement

These Specifications for the referenced projects come, in part, from uncontrolled sources and may not conform to WCAG 2.1 at level AA. Individuals with disabilities seeking assistance with the individual project plans or specifications should e-mail Contractadministration@tampagov.net.

City of Tampa

Contract Administration Department

Tampa Municipal Office Building

306 E Jackson Street #280A4N Fourth Floor

Tampa, Florida 33602

NOVEMBER 2026

TABLE OF CONTENTS

BIDDING REQUIRMENTS

Notice to Bidders.....2 thru 4
Instructions to Bidders.....5 thru 17
Instructions to Bidders Section 2.....I-2 thru I-8
Insurance Requirements.....INS 1 thru INS 4
Availability Contact List Instructions.....ACL-Instructions
SLBE Availability Contact List.....ACL-1 thru ACL-6

BID FORMS

Proposal.....14 thru 23
Good Faith effort Compliance Plan.....GFECP (DMI 50)
Attestation.....38 thru41
Criminal History Screening Practices.....BTB-1 (42)
SLBE Solicitation.....DMI 10 Form
SLBE Utilized.....DMI 20 Form
Bid Bond.....50 thru 51

CONTRACT FORMS

Agreement..... A-1 thru A-27 (PDF 52 thru 80)
Public Construction Bond.....37 thru 40 (PDF 81 thru 84)

GENERAL PROVISIONS

General Provisions.....G-1 thru G-24
Specific Provisions.....SP-1 thru SP-35

WORKMANDSHIP & MATERIALS

W-1-Excavation - Earth & Rock.....W1-1 thru W1-6
W-2-Backfilling.....W2-1 thru W2-4
W-4 Concrete Materials.....W-4-1 thru W4-2
W-5 Concrete.....W5-1 thru W5-7
W-6 Reinforcing Steel.....W6-1 Thru W6-6

W-7 Construction & Expansion Joints for Concrete .....W7-1 thru W7-5
W-8 Metal Castings .....W-8-1 thru W8-2
W-10-Ductile Iron Pipe and Fittings .....W10-1 thru W10-4
W-15-Laying & Jointing Pipe for FM&Sewers .....W15-1 thru W15-8
W-17-Lawn Replacement W17-1thruW17.2
W-18-Leakage Tests-Sewers .....W18-1 thru W18-4
W-21-Concrete Storm Sewer Pipe .....W21-1 thru W21-3
W-27-Demolition.....W27-1 thru W27-3
W-32-Valves .....W32-1 thru W32-3
W-33-Leakage Tests-PS .....W33-1 thru W33-2
W-36-Painting.....W36-1 thru W36-5
W-45- Electrical .....W45-1 thru W45-3
W-45.1 - Power System Study .....W45.1-1 thru W45.1-5
W-46.1 - PICS General Requirements .....W46.-1 thru W46.1-26
W-46.2 - PICS Field Instruments.....W46.2-1 thru W46.2-9
W-46.3 - PICS Control Panels .....W46.3-1 thru W46.3-9
W-46.4 - PICS Fiber Optic Network .....W46.4-1 thru W46.4-13
W-47 - Electric Motors .....W47-1 thru W47-4
W-48.1 - Heavy-Duty Double Throw Fusible Switch .....W48.1-1 thru W48.1-5
W-48.2 - Automatic Transfer Switch .....W48.2-1 thru W48.2-10
W-49 - Reduced Voltage Solid State Starter.....W49-1 thru W49-4
W-50-Security System .....W50-1 thru W50-10
W-72 Video Inspection.....W72-1 thru W72-4
W-76 - Conduit, Wire, and Grounding .....W76-1 thru W76-16
W-108 Dewatering .....W108-1 thru W108-5
W-110 -Clearing and Grubbing .....W110-1 thru W110-8
W-112- Trees, Plants and Groundcovers.....W112-1 thru W112-
W-113 - Disposal of Debris.....W113-1
W-115- Tree Pruning .....W115-1 thru W115- 2
W-425- Stormwater Inlets, Manholes & Junction Boxes .....W425-1 thru W425-9
W-430- Pipe Culverts & Storm Sewers.....W430-1 thru W430-5
W-555-Chain Link Fencing.....W555-1 thru W555-2
W-2930 Sodding.....W2930-1 thru W2930-7
W-16216- Diesel Engine Generator .....W16216-1 thru W16216-24

Subcontractors Payment Form.....DMI 30 Form
Project Sign .....Sign-1 thru Sign-2

NOTICE TO BIDDERS

CITY OF TAMPA, FLORIDA

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., December 1, 2026, in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida, there to be publicly opened and read aloud.

The proposed work is to include, but not be limited to, regrading of the existing stormwater pond, stormwater infrastructure improvements, construction of a new stormwater pump station including concrete wet well, related structural concrete slabs, concrete sidewalks and related site work, installation of an owner/vendor supplied pump package, owner/vendor supplied permanent genset, all related electrical equipment, controls and instrumentation, communications systems, improved security system features with all associated work required for a complete project in accordance with the Contract Documents.

The Instructions to Bidders, Proposal, Form of Bid Bond, Agreement, Form of Public Construction Bond, Specifications, Plans and other Contract Documents are posted at and may be downloaded from http://www.tampagov.net/contract-administration/programs/construction-project-bidding. One set may be available for reference at the office of the Contract Administration Department, Municipal Office Building, Fourth Floor North, City Hall Plaza, Tampa, Florida 33602.

Each Proposal must be submitted on the Proposal form included in the Specifications and must be accompanied by a certified check or cashier's check on a solvent bank or trust company in compliance with Section 255.051, Florida Statutes, made payable to the City of Tampa, in an amount of not less than five per cent of the total bid, or a Bid Bond, of like amount, on the form set forth in the Contract Documents, as a guarantee that, if the Proposal is accepted, the Bidder will execute the Proposed Contract and furnish a Public Construction Bond within twenty (20) days after receipt of Notice of Award of Contract.

To be eligible to submit a proposal, a Bidder must hold the required and/or appropriate current license, certificate, or registration (e.g. DBPR license/certificate of authorization, etc.) in good standing at the time of receipt of Bids. Per Section 489.131, Florida Statutes, Proposals submitted for the construction, improvement, remodeling, or repair of public projects must be accompanied by evidence that the

Bidder holds the required and/or appropriate current certificate or registration, unless the work to be performed is exempt under Section 489.103, Florida Statutes.

The City of Tampa reserves the right to reject any or all Bids and to waive any informalities in the Bid and/or Bid Bond. Acceptance or rejection of Proposals will be made as soon as practicable after the Proposals are received, but the City reserves the right to hold Proposals for ninety (90) days from the date of Opening.

Bid Protest Procedures: Unless subsequently indicated otherwise, in a revised posting on the Department's web page for Construction Project Bidding, the City of Tampa intends to award the referenced project to the lowest bidder listed in the tabulation posted on or about the date of Bid Opening. A bidder aggrieved by this decision may file a protest not later than 4:30 P.M., five (5) business days from the first posting thereof, pursuant to City of Tampa Code Chapter 2, Article V, Division 3, Section 2-282, Procurement Protest Procedures. Protests not conforming therewith shall not be reviewed.

Pursuant to Section 2-282, City of Tampa Code, during the solicitation period, including any protest and/or appeal, NO CONTACT with City officers or employees is permitted from any bidder or proposer, other than as specifically stated in this solicitation and as follows: Director of the Contract Administration Department (CAD); Contracts Management Supervisor, Jim Greiner; City legal department.

Any Requests For Information must be submitted by email to ContractAdministration@tampagov.net

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list." Refer to Section 287.133, Florida Statues.

Pursuant to Section 287.087, Florida Statutes, under certain circumstances preference may be given to businesses with a drug-free workplace program that meets the requirements of said Section.

INSTRUCTIONS TO BIDDERS

SECTION 1 - SPECIAL INSTRUCTIONS

I-1.01 GENERAL:

The proposed work is the Lantana-Poinsettia Stormwater Pumping Station Replacement in the City of Tampa, as required for a complete project, as shown on the plans and detailed in the specifications. The work is located on land owned or controlled by the City of Tampa.

To be eligible to submit a proposal, a Bidder must hold the required and/or appropriate current license, certificate, or registration (e.g. DBPR license/certificate of authorization, etc.) in good standing at the time of receipt of Bids. Per Section 489.131, Florida Statutes, Proposals submitted for the construction, improvement, remodeling, or repair of public projects must be accompanied by evidence that the Bidder holds the required and/or appropriate current certificate or registration, unless the work to be performed is exempt under Section 489.103, Florida Statutes.

I-1.02 FORM PREPARATION AND PRESENTATION OF PROPOSALS: Replace the second sentence with the following: Submission of the entire specification book is not required.

I-1.03 ADDENDA – Section I-2.03 is replaced with the following: No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the City of Tampa, Contract Administration Department, 306 E. Jackson St., 4th Floor, Tampa, Florida 33602 and then emailed to ContractAdministration@tampagov.net. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be posted on the Department's web page. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-1.04 INSTRUCTIONS TO BIDDERS

SECTION 2 – GENERAL INSTRUCTIONS. Section I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS is replaced with the following:

> Proposals must be signed in ink by the Bidder with signature in full. When firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more partners. When a corporation is a bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office.
>
> If the bidder referred to in Section I-2.07 is a corporation, it must submit; upon request, a copy of its filed Articles of Incorporation. In addition, if the bidder was incorporated in another state, it must establish that it is authorized to do business in the State of Florida. If the bidder is using a fictitious name, it must submit upon request, proof of registration of such name with the Clerk of the Circuit Court of the County where its principal place of business is. Failure to submit what is required is grounds to reject the bid of that bidder.

SECTION 2 – GENERAL INSTRUCTIONS. Section I-2.14 NONDISCRIMINATION IN EMPLOYMENT is changed to add the following to the end of the existing text:

The following provisions are hereby incorporated into any contract executed by or on behalf of the City. Contractor shall comply with the following Statement of Assurance: During the performance of the Contract, the Contractor assures the City, that the Contractor is in compliance with Title VII of the 1964 Civil Rights Act, as amended, the Florida Civil Rights Act of 1992, and the City of Tampa Code of Ordinances, Chapter 12, in that Firm/Contractor does not on the grounds of race, color, national origin, religion, sex, sexual orientation, gender identity or expression, age, disability, familial status, or marital status, discriminate in any form or manner against said Firm's/Contractor's employees or applicants for employment. Contractor understands and agrees that the Contract is conditioned upon the veracity of this Statement of Assurance, and that violation of this condition shall be considered a material breach of the Award/Contract. Furthermore, Contractor herein assures the City that said Contractor will comply with Title VI of the Civil Rights Act of 1964 when federal grant(s) is/are involved. This Statement of Assurance shall be interpreted to include Vietnam-Era Veterans and Disabled Veterans within its protective range of applicability. Firm/Contractor further acknowledges and agrees to

provide the City with all information and documentation that may be requested by the City from time to time regarding the solicitation, selection, treatment and payment of subcontractors, suppliers and vendors in connection with this Award/Contract. Firm/Contractor further acknowledges that it must comply with City of Tampa Code of Ordinances, Chapter 26.5.

I-1.05 TIME FOR COMPLETION:

The work shall be arranged to be completed in accordance with a progress schedule approved by the Construction Engineer.

The time for completion of this project, referred in Article 4.01 of the Agreement, shall be 240 consecutive calendar days. The period for performance shall start from the date indicated in the Notice To Proceed.

The construction schedule may be adjusted from time to time in order to accommodate major event activities.

I-1.06 LIQUIDATED DAMAGES:

The amount of liquidated damages, referred to in Article 4.06 of the Agreement, for completion of this project shall be $500 per calendar day.

I-1.07 BASIS OF AWARD OF CONTRACT:

The basis of award referred to in Item I-2.11 of Instructions to Bidders shall be the greatest amount of work, which can be accomplished within the funds available as budgeted. The award may be made on the basis of the total bid, base bid, alternates(s) if any, unit bids if any, or any combination thereof deemed to be in the best interest of the City.

Unless all bids are rejected, the award will be made within 90 days after opening proposals.

The City may, at its option, award to more than one bidder.

I-1.08 GROUND BREAKING CEREMONY:

Arrangement may be made by the City in coordination with the Contractor, for construction to commence with a Ground Breaking Ceremony. Details will be discussed at the pre-construction conference.

I-1.09 INSURANCE:

The insurance required for this project shall be as indicated on the attached and incorporated Special Instructions pages beginning with page INS-1 entitled CITY OF TAMPA INSURANCE REQUIREMENTS, which among other things requires the Contractor to provide a Certificate of Insurance to the City prior to commencing work. The City may from time to time use a third-party vendor to manage its insurance certificates and related documentation which vendor may periodically initiate contact, requests for information, etc. on the City's behalf.

I-1.10 TESTING:

The Contractor shall perform all Quality Control (QC) testing to meet the FDOT requirements in the Florida Department of Transportation, JULY 2022 Standard Specifications for Road and Bridge Construction.

I-1.11 EQUAL BUSINESS OPPORTUNITY PROGRAM (EBO) REQUIREMENTS / PROJECT SUBCONTRACTING GOAL(S):

BIDDERS MUST Refer to attached form DMI-90 for Subcontracting Goals and Instructions.

I-1.12 BID SECURITY:

Surety companies shall have a rating of not less than B+ Class VI as evaluated in the most recently circulated Best KeyRating Guide Property/Casualty.

I-1.13 PUBLIC CONSTRUCTION BOND:

The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be issued and executed by (a) surety company(ies) acceptable to the City and licensed to underwrite contracts in the

State of Florida. After execution of the Agreement and before commencing work, the Contractor must provide the City a certified copy of the officially recorded Bond.

I-1.14 AGREEMENT

SECTION 2 – POWERS OF THE CITY'S REPRESENTATIVES - Add the following:

Article 2.05 CITY'S TERMINATION FOR CONVENIENCE:

The City may, at any time, terminate the Contract in whole or in part for the City's convenience and without cause. Termination by the City under this Article shall be by a notice of termination delivered to the Contractor, specify the extent of termination and the effective date.

Upon receipt of a notice of termination, the Contractor shall immediately, in accordance with instructions from the City, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

(a) cease operations as specified in the notice;

(b) place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete continued portions of the Contract;

(c) terminate all subcontracts and orders to the extent they relate to the Work terminated;

(d) proceed to complete the performance of Work not terminated; and

(e) take actions that may be necessary, or that the City may direct, for the protection and preservation of the terminated Work.

The amount to be paid to the Contractor by the City because of the termination shall consist of:

(a) for costs related to work performed on the terminated portion of the Work prior to the effective date including termination costs relative to subcontracts that are properly chargeable to the terminated portion of the Work;

(b) the reasonable costs of settlement of the Work terminated, including accounting, legal, clerical and other expenses reasonable necessary for the preparation of termination settlement proposals and supporting data; additional costs of termination and settlement of subcontracts excluding amounts of such settlements; and storage, transportation, and other costs incurred which are reasonably necessary for the preservation, protection or disposition of the terminated Work; and

(c) a fair and reasonable profit on the completed Work unless the Contractor would have sustained a loss on the entire Contract had it been completed.

Allowance shall be made for payments previously made to the Contractor for the terminated portion of the Work, and claims which the City has against the Contractor under the Contract, and for the value of materials supplies, equipment or other items that are part of the costs of the Work to be disposed of by the Contractor.

SECTION 4 – TIME PROVISIONS, Article 4.07

Replace the second paragraph with the following: "However, if such inspection reveals items of work still to be performed the Contractor shall provide for approval by the Engineer an estimate of the cost of each item and promptly perform them and then request a reinspection to be made within ten (10) days after receipt of such request. If, upon any reinspection, the Engineer determines that the work is complete, the date of final completion shall be deemed to be the last day of such reinspection."

SECTION 5 – SUBCONTRACTS AND ASSIGNMENTS, Article 5.01, Change "…twenty-five (25) percent…" to "…fifty-one (51) percent…".

SECTION 8 – CONTRACTOR'S EMPLOYEES, Article 8.03, Replace with the following new article:

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES

The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination and must not maintain, provide or permit facilities that are segregated.

SECTION 10 – PAYMENTS, Article 10.05:

Change "…fair value of the work done, and may apply for…" to "…fair value of the work done, and shall apply for…" Note: Retainage as referenced in Article 10.05 is limited to a maximum of five percent (5%). Payment Applications must be submitted through the city's construction software, Trimble Unity Construct. Additional information is available at https://www.tampa.gov/contract-administration/trimbleconstruct .

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.02:

Delete the 2nd Sentence in its entirety and replace it with the following new 2nd Sentence:

Without limiting application of Article 11.07, below, whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify, defend, and hold harmless the City Indemnified Parties (as defined below) from any and all Claims (as defined below) for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.03: Delete Article 11.03 in its entirety and replace with the following new article: ARTICLE 11.03 INTENTIONALLY OMITTED.

SECTION 11 – MISCELLANEOUS PROVISIONS: Delete Article 11.07 in its entirety and replace with the following new article:

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

Whenever there appears in this Agreement, or in the other Contact Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

Contractor releases and agrees to defend, indemnify and hold harmless the City, its officers, elected and appointed officials, employees, and/or agents (collectively, "City Indemnified Parties") from and against any and all losses, liabilities, damages, penalties, settlements, judgments, charges, or costs (including without limitation attorneys' fees, professional fees, or other expenses) of every kind and character arising out of any and all claims, liens, is entitled to indemnification hereunder. This obligation shall in no way be limited in any nature whatsoever by any limitation on the amount or type of Contractor's insurance coverage.

The parties agree that to the extent the written terms of this indemnification are deemed by a court of competent jurisdiction to be in conflict with any provisions of Florida law, in particular Sections 725.06 and 725.08, Florida Statutes, the written terms of this indemnification shall be deemed by any court of competent jurisdiction to be modified in such a manner as to be in fully and complete compliance with all such laws and to contain such limiting conditions or limitations of liability, or to not contain any unenforceable or prohibited term or terms, such that this indemnification shall be enforceable in accordance with and to the maximum extent permitted by Florida law.

The obligation of Contractor under this Article is absolute and unconditional; it is not conditioned in any way on any attempt by a City Indemnified Party to collect from an insurer any amount under a liability insurance policy, and is not subject to any set-off, defense, deduction, or counterclaim that the Contactor might have against the City Indemnified Party. The duty to defend hereunder is independent and separate from the duty to indemnify, and the duty to defend exists regardless of any ultimate liability of Contractor, the City, and any City Indemnified Party. The duty to defend arises immediately upon presentation of a Claim by any party and written notice of such Claim being provided to Contractor. Contractor's defense and indemnity obligations hereunder will survive the expiration or earlier termination of this Contract.

Contractor agrees and recognizes that the City Indemnified Parties shall not be held liable or responsible for any Claims which may result from any actions or omissions of Contractor in which the City Indemnified Parties participated either through providing data or advice and/or review or concurrence of Contractor's actions. In reviewing, approving or rejecting any

submissions by Contractor or other acts of Contractor, the City in no way assumes or shares any responsibility or liability of Contractor or any tier of subcontractor/subconsultant/supplier, under this Contract.

In the event the law is construed to require a specific consideration for such indemnification, the parties agree that the sum of Ten Dollars and 00/100 ($10.00), receipt of which is hereby acknowledged, is the specific consideration for such indemnification and the providing of such indemnification is deemed to be part of the specifications with respect to the services provided by Contractor.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.12 add the following new language after existing text:

The City of Tampa is a public agency subject to Chapter 119, Florida Statutes. In accordance with Florida Statutes, 119.0701, Contractor agrees to comply with Florida's Public Records Law, including the following:

1. Contractor shall keep and maintain public records required by the City to perform the services under this Agreement;

2. Upon request by the City, provide the City with copies of the requested records, having redacted records in total on in part that are exempt from disclosure by law or allow the records to be inspected or copied within a reasonable time (with provision of a copy of such records to the City) on the same terms and conditions that the City would provide the records and at a cost that does not exceed that provided in Chapter 119, Florida Statutes, or as otherwise provided by law;

3. Ensure that records, in part or in total, that are exempt or that are confidential and exempt from disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and following completion (or earlier termination) of the Agreement if Contractor does not transfer the records to the City;

4. Upon completion (or earlier termination) of the Agreement, Contractor shall within 30 days after such event either transfer to the City, at no cost, all public records in possession of the Contractor or keep and maintain the public records in compliance with Chapter 119, Florida Statutes. If Contractor transfers all public records to the City upon completion (or earlier termination) of the Agreement, Contractor shall destroy any duplicate records that are exempt or confidential and exempt from public records disclosure requirements. If Contractor keeps and maintains public records upon completion (or earlier termination) of the Agreement, Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City in a format that is compatible with the information technology systems of the agency.

The failure of Contractor to comply with Chapter 119, Florida Statutes, and/or the provisions set forth in this Article shall be grounds for immediate unilateral termination of the Agreement by the City; the City shall also have the option to withhold compensation due Contractor until records are received as provided herein.

IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 813-274-8598, JIM.GREINER@TAMPAGOV.NET, AND CONTRACT ADMINISTRATION DEPARTMENT, TAMPA MUNICIPAL OFFICE BUILDING, 4TH FLOOR, 306 E. JACKSON ST. TAMPA, FLORIDA 33602.

I-1.15 Contractors must utilize the U.S. Department of Homeland Security's E-Verify Systems to verify the employment eligibility of all persons employed during the term of the Contract to perform employment duties within the State of Florida and all persons, including subcontractors, assigned by Contractor to perform work pursuant to the contract.

I-1.16 GENERAL PROVISIONS; G-2.02 Copies Furnished to Contractor: Replace the first paragraph with the following:

The Contractor shall acquire for its use copies of the plans and specifications as needed, which may be downloaded from the City's web site, at http://www.tampagov.net/contract-administration/programs/construction-project-bidding.

Bidder as part of the solicitation process (and as Contractor if Bidder is successful) may hold, come into possession of, and/or generate certain building plans, blueprints, schematic drawings, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, facility, or other structure owned or operated by the City or an agency (singularly or collectively "Exempt Plans"), which pursuant to Section 119.071(3), Florida Statutes, are exempt from Section 119.07(1), Florida Statutes and Section 24(a), Art. I of the Florida State Constitution. Contractor certifies it has read and is familiar the exemptions and obligations of Section 119.071(3), Florida Statutes; further that Contractor is and shall remain in compliance with same, including without limitation maintaining the exempt status of such Exempt Plans, for so long as any Exempt Plans are held by or otherwise in its possession.

I-1.17 PAYMENT DISPUTE RESOLUTION

Any dispute pertaining to pay requests must be presented to the City pursuant to Executive Order 2003-1.

I-1.18 SCRUTINIZED COMPANIES CERTIFICATION

Section 287.135, Florida Statutes, prohibits agencies or local governmental entities from contracting for goods or services of any amount with companies that are on the Scrutinized Companies that Boycott Israel List or are engaged in a boycott of Israel, and of $1 million or more with companies that are on either the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or are engaged in business operations in Cuba or Syria. Specifically, Section 287.135(2), Florida Statutes, states: "A company is ineligible to, and may not, bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of: (a) Any amount if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to s. 215.4725, or is engaged in a boycott of Israel; or (b) One million dollars or more if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company: 1. Is on the Scrutinized Companies with Activities in

Sudan List or the Scrutinized Companies with Activities in the Iran Terrorism Sectors List, created pursuant to s. 215.473; or 2. Is engaged in business operations in Cuba or Syria."

Upon submitting its bid or proposal, a bidder/proposer: (i) certifies the company is not in violation of Section 287.135, Florida Statutes, and shall not be in violation at the time the company enters into or renews any resulting contract; and (ii) agrees any such resulting contract shall be deemed to contain a provision that allows the City, at

its option, to terminate such contract for cause if the company is found to have submitted a false certification, been placed on one or any of the foregoing Lists, been engaged in a boycott of Israel, or been engaged in business operations in Cuba or Syria.

I-1.19 FLORIDA'S PUBLIC RECORDS LAW; DATA COLLECTION

Pursuant to Section 119.071(5)(a)2a, Florida Statutes, social security numbers shall only be collected from Bidders and/or Contractor by the City should such number be needed for identification, verification, and/or tax reporting purposes. To the extent Bidder and/or Contractor collects an individual's social security number in the course of acting on behalf of the City pursuant to the terms and conditions of its Proposal or, if awarded, the Agreement, Bidder and/or Contractor shall follow the requirements of Florida's Public Records Law.

I-1.20 BIDDER'S CRIMINAL HISTORY SCREENING PRACTICES

Per City of Tampa Code of Ordinances, Section 2-284, Bidder is requested to provide information as to whether Bidder has criminal history screenings similar in nature to the practices contained in Chapter 12, Article VI, City of Tampa Code of Ordinances. If the Bidder voluntarily agrees to comply with the City's criminal screening practices as provided in Chapter 12, Article IV of the City Code, the Bidder will receive a two percent (2%) discount for evaluation purposes only if Bidder submits notarized documentation with its bid, and an assurance of compliance with Section 2-284 if awarded the contract ("Ban the Box Requirements"). The City of Tampa's municipal codes are published online by the Municipal Code Corporation at the website link below.

https://library.municode.com/fl/tampa/ordinances/code_of_ordinances?nodeId=1171018

Bidders must complete Form BTB-1 and include with its bid.

I-1.21 FLORIDA STATUTES 287.05701

The City of Tampa will not request documentation of or consider a bidder's (proposer's) social, political, or ideological interests when determining if the bidder (proposer) is a responsible vendor and will not give preference to a bidder (proposer) based on the bidder's (proposer's) social, political, or ideological interests.

INSTRUCTIONS TO BIDDERS

SECTION 2

GENERAL INSTRUCTIONS

I-2.01 BIDDER'S RESPONSIBILITY

Before submitting Proposals, Bidders shall carefully examine the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and make all necessary investigations to inform themselves thoroughly as to the facilities necessary for delivering, placing and operating the necessary construction equipment, and for delivering and handling materials at the site, and inform themselves thoroughly as to all difficulties involved in the completion of all the work in accordance with the Contract Documents.

Bidders must examine the Plans, Specifications, and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done, and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amounts or quantities necessary to complete the work in strict compliance with the Contract Documents.

Elevations of the ground are shown on the Plans and are believed to be reasonably correct, but are not guaranteed to be absolutely so and are presented only as an approximation. Bidders shall satisfy themselves as to the correctness of all elevations.

The City may have acquired, for its own use, certain information relating to the character of materials, earth formations, probable profiles of the ground, conditions below ground, and water surfaces to be encountered at the site of the proposed work. This information, if it exists, is on file at the offices of the Department of Public Works and Bidders will be permitted to see and examine this information for whatever value they consider it worth. However, this information is not guaranteed, and Bidders should satisfy themselves by making borings or test pits, or by such other methods as they may prefer, as to the character, location, and amounts of water, peat, clay, sand, quicksand, gravel, boulders, conglomerate, rock, gas or other material to be encountered or work to be performed.

Various underground and overhead structures and utilities are shown on the plans. The location and dimensions of such structures and utilities, where given, are believed to be reasonably correct, but do not purport to be absolutely so. These structures and utilities are plotted on the Plans for the information of the Bidders, but information so given is not to be construed as a representation or assurance that such structures will be found or encountered as plotted, or that such information is complete or accurate.

I-2.02 FORM, PREPARATION AND PRESENTATION OF PROPOSALS

Each Proposal shall be submitted upon the Proposal Form and in accordance with the instructions included herein. The Proposal Form must not be detached herefrom. All blank spaces for bid prices must be filled in, in both words and figures, with the unit or lump sum prices, or both, for which the Proposal is made. The computed total price for each unit price Contract Item shall be determined by multiplying the estimated quantity of the item, as set forth in the Proposal Form, by the corresponding unit price bid for such item. The resulting product shall be entered in the appropriate blank space under the column headed "Computed Total Price for Item". The lump sum price bid for each lump sum price bid for each lump sum price Contract Item shall also be entered in the column headed "Computed Total Price for Item". If a Proposal contains any omissions, erasures, alterations, additions, or items not called for in the itemized Proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of the Proposal. In case of any discrepancy in the unit price or amount bid for any item in the Proposal, the price is expressed in written words will govern. In no case is the Agreement Form to be filled out or signed by the Bidder.

In the case of certain jobs bid Lump Sum a "Schedule of Unit Prices" must be filled out as an attachment to the Lump Sum proposal. These prices may be used as a guide for the negotiation of change orders, at the City's option.

The proposal must be signed and certified and be presented on the prescribed form in a sealed envelope on/or before the time and at the place stated in the Notice of Bidders, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the Proposal is made.

Unless the apparent low bidder is now engaged in or has recently completed contract work for the City of Tampa, he, if requested, shall furnish to the City, after the opening of bids and prior to award, a summary statement of record of construction experience over the past three (3) years with proper supporting evidence, and, if required by the City, shall also furnish a list of equipment and other facilities pertinent to and available for the proper execution of the proposed work, and a statement of financial resources to the extent necessary to establish ability to carry on the proposed work. The City may make further investigations as considered necessary with respect to responsibility of the Bidder to whom it appears may be awarded the Contract.

If forwarded by mail, the sealed envelope containing the Proposal, endorsed as directed above, must be enclosed in another envelope addressed as specified in the Notice to Bidders and sent by registered mail.

I-2.03 ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the Department of Public Works, Tampa Municipal Office Building, 4th Floor North, City Hall Plaza, Tampa, Florida 33602. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by certified mail, with return receipt requested, to all prospective bidders at the respective addresses furnished, for such purposes, not later than three (3) working days prior to the date fixed for the opening of the Proposals, and if requested, a copy will be delivered to the prospective bidder's representative. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-2.04 BID SECURITY

Each Proposal must be accompanied by a certified or cashier's check issued by a solvent bank or trust company and payable at sight to the City of Tampa, in compliance with Section 255.051 Florida Statutes, or a Bid Bond upon the form provided herein, in an amount of not less than five percent of the sum of the computed total amount of the Bidder's Proposal as a guarantee that if the Proposal is accepted, the Bidder will execute and fill in the proposed Contract and Performance Bond within ten (10) days after notice of award of the Contract. Certified checks shall have all necessary documentary revenue stamps attached if required by law. Surety on Bid Bonds shall be a duly authorized surety company authorized to do business in the State of Florida, and all such Bonds shall be issued or countersigned by a local resident producing agent, and satisfactory evidence of the authority of the person or persons executing such Bond to Execute the same shall be submitted with the Bond. Bid Bonds shall be issued by a surety company acceptable to the City.

Within ten (10) days after the opening of Proposals, the bid security of all but the three lowest Bidders will be returned. The bid security of the remaining two Bidders whose Proposals are not accepted will be returned within ten (10) days after the execution of the Contract, or, if no such Contract has been executed, within sixty (60) days after the date of opening Proposals. The bid security of the Bidder whose Proposal is accepted will be returned only after he has duly executed the Contract and furnished the required Performance Bond and insurance.

Should it be necessary for the City to retain the bid security of the three low Bidders for a period

beyond twenty (20) days after the Proposals are received, and said bid security is in the form of checks, the checks of these Bidders will be returned if replaced by Bid Bonds in an amount equal to the amount of the checks of such Bidders in such form and issued by a surety company acceptable to the City.

A Bidder may withdraw his Proposal before the time fixed for the opening of Proposals, without prejudice to himself, by communicating his purpose, in writing, to the Mayor and City Council, and when his communication is received, the Proposal will be handed to him or his authorized agent unopened. No Bidder may withdraw his Proposal within sixty (60) days after the day of opening Proposals.

The Bidder whose Proposal is accepted shall enter into a written contract, upon the Agreement form included herein, for the performance of the work and furnish the required Performance and Payment Bond within ten days after written notice of the City of Award of Contract has been served on such Bidder personally or after receipt of the written notice by registered mail to such Bidder at the address given in his Proposal.

If the Bidder to whom a Contract is awarded refuses or neglects to execute it or fails to furnish the required Performance and Payment Bond within ten (10) days after receipt by him of the Notice of Award of Contract, the amount of his bid security shall be forfeited and shall be retained by the City as liquidated damages, and not as a penalty, it being now agreed that said sum is a fair estimate of the amount of damages that the City will sustain in case said Bidder fails to enter into a Contract and furnish the required Performance Bond. If a Bid Bond was furnished, the full amount of the Bond shall become due and payable as liquidated damages caused by such failure. The full amount of the bid security shall be forfeited as liquidated damages without consideration of the fact that an award may be less than the full amount of the Bidder's Proposal, excepting that the award shall be within the conditions of said Proposal relating to the basis of consideration for an award. No plea of mistake in the bid or mis-understanding of the conditions of forfeiture shall be available to the Bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

I-2.05 LAWS AND REGULATIONS

The Bidder who is awarded the Contract must comply with all laws of the State of Florida, and all applicable Ordinances of the City of Tampa respecting labor and compensation and with all other statutes, ordinances, rules and regulations applicable and having the force of law.

I-2.06 PERFORMANCE AND PAYMENT BOND

The Bidder who is awarded the Contract will be required to furnish Performance and Payment Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be executed

by a surety company acceptable to the City of Tampa and licensed to underwrite contracts in the State of Florida. Surety companies shall have a rating of not less than: Class X as evaluated in the most recently circulated BEST'S KEY RATING GUIDE PROPERTY- LIABILITY.

I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS

Proposals must be signed in ink by the Bidder with signature in full. When a firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more of the partners. When a corporation is a Bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and vie the title of his office. The Proposal shall also bear the seal of the corporation attested by its secretary. Anyone signing the Proposal as agent must file with it legal evidence of his authority to do so.

Bidders who are nonresident corporations shall furnish to the City a duly certified copy of their permit to transact business in the State of Florida, signed by the Secretary of State, within ten days of the notice to do so. Such notice will be given to Bidders who are nonresident corporations, to whom it appears an award will be made, and the copy of the permit must be filed with the City before the award will be made. Failure to promptly submit this evidence of qualification to do business in the State of Florida may be basis for rejection of the Proposal.

I-2.08 REJECTION OF PROPOSALS

The City reserves the right to reject any Proposal if investigation of the Bidder fails to satisfy the City that such Bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all Proposals will be rejected if there is reason to believe that collusion exists among Bidders. Proposals will be considered irregular and may be rejected if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alternates, or irregularities of any kind. The City reserves the right to reject any or all Proposals and to waive such technical errors as may be deemed best for the interests of the City.

I-2.09 QUANTITIES ESTIMATED ONLY

The estimate of quantities of the various items of work and materials, if set forth in the Proposal Form, is approximate only and is given solely to be used as a uniform basis for the comparison of Proposals. The quantities actually required to complete the Contract work may be less or more than so estimated, and if awarded a Contract for the work specified, the Contractor agrees that he will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work assumed for comparison of Proposals and quantities of work actually performed. The City further reserves the right to vary the quantities in any amount.

I-2.10 COMPARISON OF PROPOSALS

Except jobs bid on a "One Lump Sum" basis, proposals will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantity of each time and the corresponding unit price of each item, and including any lump sum prices on individual items.

The computed total prices for individual Contract Items and the total computed price for the entire Contract, as entered by the Bidder in the Proposal Form, are for convenience only and are subject to correction in the tabulation and computation of the Proposals.

I-2.11 BASIS OF AWARD

The Contract will be awarded, if at all, to the lowest responsible Bidder or Bidders, as determined by the City and by the terms and conditions of the Contract Documents. Unless all bids are rejected, the award will be made within sixty (60) days after the opening of Proposals.

The successful Bidder will be required to possess, or obtain, a valid City Occupational License.

I-2.12 INSURANCE REQUIRED

The successful Bidder and his subcontractors will be required to procure and pay for insurance covering the work in accordance with the provisions of Article 6.02 of the Agreement as indicated on special instructions pages begining with INS-1.

I-2.13 NO ASSIGNMENT OF BID

No Bidder shall assign his bid or any rights thereunder.

I-2.14 NONDISCRIMINATION IN EMPLOYMENT

Contracts for work under this Proposal will obligate the contractors and subcontractors not to discriminate in employment practices.

I-2.15 LABOR STANDARDS

The Bidder's attention is directed to applicable Contract Provisions of the Labor Standards for federally assisted projects which may be attached to and made a part of the Agreement.

I-2.16 NOTICE TO LABOR UNIONS

If applicable, the successful Bidder will be required to provide Labor Unions and other organizations of workers a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers", and such form may be made a part of the Agreement.

I-2.17 Not Applicable

I-2.18 Not Applicable

CITY OF TAMPA INSURANCE REQUIREMENTS

Prior to commencing any work or services or taking occupancy under that certain written agreement or award (for purposes of this document, Agreement) between the City of Tampa, Florida (City) and Firm/Awardee/Successful Proposer/Contractor/Consultant/Lessee/non-City party, etc. (for purposes of this document, Firm) to which this document is attached and incorporated as an Exhibit or otherwise, and continuing during the term of said Agreement (or longer if the Agreement and/or this document so requires), Firm shall provide, pay for, and maintain insurance against claims which may arise from or in connection with the performance of the Agreement (including without limitation occupancy and/or use of certain property/premises) by Firm, its agents, representatives, employees, suppliers, subtenants, or subcontractors (which term includes sub-consultants, as applicable) of any tier subject to the terms and conditions of this document. Should at any time Firm not maintain the insurance coverages required, City at its sole option (but without any obligation or waiver of its rights) may terminate the Agreement. All provisions intended to survive or to be performed subsequent to the expiration or termination of the Agreement shall survive, including without limitation Firm's obligation to maintain or renew coverage, provide evidence of coverage and certified copies of policies, etc. upon City's request and/or in response to a potential claim, litigation, etc.

The following coverages are required: ("M" indicates million(s), for example $1M is $1,000,000)

A. **Commercial General Liability (CGL) Insurance** on the most current Insurance Services Office (ISO) Form CG 00 01 or its equivalent on an "occurrence" basis (Modified Occurrence or Claims Made forms are not acceptable without prior written consent of the City). Coverage must be provided to cover liability contemplated by the Agreement including without limitation premises and operations, independent contractors, contractual liability, products and completed operations, property damage, bodily, personal and advertising injury, contractual liability, explosion, collapse, underground coverages, personal injury liability, death, employees-as-insureds. Products and completed operations liability coverage maintained for at least 3 years after completion of work. **Limits shall not be less than $1M per occurrence and $2M general aggregate for Agreements valued at $2M or less; if valued over $2M, a general aggregate limit that equals or exceeds the Agreement's value.** If a general aggregate limit applies, it shall apply separately to the project/location (ISO CG 25 03 or 25 04 or equivalent).

B. **Automobile Liability (AL) Insurance** in accordance with Florida law, as to the ownership, maintenance, and use of all owned, non-owned, leased, or hired vehicles. **AL insurance shall not be less than: (a) $500,000 combined single limit each occurrence bodily injury and property damage for Agreements valued at $100,000 or less or (b) $1M combined single limit each occurrence bodily injury and property damage for Agreements valued over $100,000.** If transportation of hazardous material involved, the MCS-90 endorsement (or equivalent).

C. **Worker's Compensation (WC) & Employer's Liability Insurance** for all employees engaged under the Agreement, Worker's Compensation as required by Florida law. **Employer's Liability with minimum limits of (a) $500,000 bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each employee for Agreements valued at $100,000 and under or (b) $1M bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each for all other Agreements**.

D. **Excess (Umbrella) Liability Insurance** for Agreements valued at $2M or more, at least $4M per occurrence in excess of underlying limits and no more restrictive than underlying coverage for all work performed by Firm. May also compensate for a deficiency in CGL, AL, or WC.

Firm affirmatively states that the insurance requirements as set forth above are of adequate types and amounts of insurance coverage for any type of claim/loss for the proposed work or services.

ACCEPTABILITY OF INSURERS - Insurance is to be placed with insurers admitted in the State of Florida and who have a current A.M. Best rating of no less than **A-:VII** or, if not rated by A.M. Best, as otherwise approved by the City in advance and in writing.

ADDITIONAL INSURED - City, its elected officials, departments, officers, officials, and employees shall be covered as additional insureds on all liability coverage (e.g. CGL, AL, and Excess (Umbrella) Liability) as to liability arising out of work or operations performed by or on behalf of Firm including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of Firm. Coverage can be provided in the form of an endorsement to Firm's insurance (at least as broad as ISO Form CG 20 10 11 85 or **both** CG 10 20, CG 20 26, CG 20 33, or CG 20 38 **and** CG 20 37 if later revisions used).

CANCELLATION/NON-RENEWAL – Each insurance policy shall provide that at least 30 days written notice must be given to City of any cancellation, intent to non-renew, or material reduction in coverage (except aggregate liability limits) and at least 10 days' notice for non-payment of premium. Firm shall also have an independent duty to notify City in like manner, within 5 business days of Firm's receipt from its insurer of any notices of same. If any policy's aggregate limit is reduced, Firm shall directly take steps to have it reinstated. Notice and proof of renewal/continued coverage/certifications, etc. shall be sent to the City's notice (or Award contact) address as stated in the Agreement with a copy to the following: ☐ Purchasing Department, 306 E Jackson Street, Tampa, FL 33602

☒ Other: City of Tampa Insurance Compliance c/o Contract Administration Department
306 E. Jackson St. #280A4N, Tampa Florida 33602

CERTIFICATE OF INSURANCE (COI) AND ENDORSEMENTS – to be provided to City by insurance carrier prior to Firm beginning any work/services or taking occupancy and, if the insurance expires prior to completion of the work or services or Agreement term (as may be extended), a renewal COI at least 30 days before expiration to the above address(es). COIs shall specifically identify the Agreement and its subject (project, lease, etc.), shall be sufficiently comprehensive to insure City (named as additional insured) and Firm and to certify that coverage extends to subcontractors' acts or omissions, and as to permit the City to determine the required coverages are in place without the responsibility of examining individual policies. **Certificate Holder must be The City of Tampa, Florida**.

CLAIMS MADE – If any liability insurance is issued on a claims made form, Firm agrees to maintain such coverage uninterrupted for at least 3 years following completion and acceptance of the work either through purchase of an extended reporting provision or purchase of successive renewals. The Retroactive Date must be shown and be a date not later than the earlier of the Agreement date or the date performance/occupancy began thereunder.

DEDUCTIBLES/ SELF-INSURED RETENTIONS (SIR) – must be disclosed to City and, if over $500,000, approved by the City in advance and in writing, including at City's option being guaranteed, reduced, or eliminated (additionally if a SIR provides a financial guarantee guaranteeing payment of losses and related investigations, claim administration, and defense expenses). Firm shall be fully responsible for any deductible or SIR (without limiting the foregoing a policy with a SIR shall provide or be endorsed to provide that the SIR may be satisfied by either the City or named insured). In the event of loss which would have been covered but for a deductible or SIR, City may withhold from any payment due Firm, under any agreement with the City, an amount equal to same to cover such loss should full recovery not be obtained under the policy.

PERFORMANCE – All insurance policies shall be fully performable in Hillsborough County, Florida (the County), and construed in accordance with Florida law. Further, all insurance policies must expressly state that the insurance company will accept service of process in the County and that the exclusive venue for any action concerning any matter under those policies shall be in the appropriate state court of the County.

PRIMARY POLICIES - Firm's insurance coverage shall be primary insurance coverage at least as broad as ISO CG 20 01 04 13 as to the City, its elected officials, departments, officers, and employees.. Any insurance or self-insurance maintained by the City, its elected officials, departments, officers, and employees shall be excess of the Firm's insurance and shall not contribute with it.

UNAVAILABILITY – To the fullest extent permitted by law, if Firm is out of business or otherwise unavailable at the time a claim is presented to City, Firm hereby assigns to the City all of its right, title and interest (but not any liabilities or obligations) under any applicable policies of insurance.

WAIVER OF SUBROGATION – With regard to any policy of insurance that would pay third party losses, Firm hereby grants City a waiver of any right to subrogation which any insurer of Firm may acquire against the City by virtue of the payment of any loss under such insurance. Firm agrees to obtain any endorsement that may be necessary to affect such waiver, but this provision shall apply to such policies regardless.

REVISED 7/14/2026

Instructions Regarding Use of the SLBE Availability Contact List

Bidders must solicit a subcontracting bid from ALL of the firms listed on the SLBEs list provided within the Specifications, and provide documentation of emails, faxes, phone calls, letters, or other communication with the firms as a first step in demonstrating Good-Faith Efforts to achieve the goal set for SLBE participation on this contract.

The list is formatted to facilitate e-mailing of a solicitation to the listed firms by copying and pasting the email addresses.

The SLBE participation Goal is based upon the availability of the certified firms indicated on the contact list. The Goal and Requirements of the City's Equal Business Opportunity Program are stated in the Bid/Contract Document, Specifications.

EQUAL BUSINESS OPPORTUNITY PROGRAM (EBO) REQUIREMENTS / PROJECT SUBCONTRACTING GOAL(S) – DMI 90 Form

BIDDERS MUST SUBMIT COMPLETED AND SIGNED CITY OF TAMPA FORMS DMI-10 AND DMI-20 WITH THEIR BIDS. BIDS SUBMITTED WITHOUT THESE COMPLETED FORMS (INCLUDING SIGNATURES) WILL BE DEEMED NON-RESPONSIVE. INSTRUCTIONS ON COMPLETING THE FORMS ARE INCLUDED AFTER EACH FORM IN THIS BID PACKAGE.

THE CHECKED BOX INDICATES THE SECTION THAT APPLIES TO THIS BID. – DMI 90 Form

[X] SUBCONTRACTING GOAL – (SLBE)

In accordance with the City of Tampa's EBO Program, Chapter 26.5, City of Tampa Code, the subcontracting goal(s) has/have been established for subcontracting SLBEs (Small Local Business Enterprises) on this project (hereinafter "Goal"). *The Goal is based, in part, upon the availability of City-certified firms to perform the anticipated scope of work (Bid is subject to the subcontracting project goal(s) section for which a corresponding numerical percent is indicated).*

Project Industry Category: Construction

Project Goal(s): 13.3% SLBE (Small Local Business Enterprise) (EBO Program) *only City-certified SLBEs*

_____% SLBE ASPIRATIONAL (EBO Program) An all-inclusive SLBE goal; any City certified firm counts towards goal attainment.

BIDDERS MUST SOLICIT ALL COMPANIES ON THE ATTACHED AVAILABILITY CONTACT LIST at least five (5) City business days or more prior to bid opening as a first step to demonstrate Good Faith Efforts to achieve the Goal. Substantive documentation that demonstrates Good Faith Efforts to achieve the Goal must be submitted with the bid, including emails, faxes, phone calls, letters, and other communication with City-certified firms. Bidders may explore other potential opportunities for subcontracting by consulting the current directory of all certified firms posted by the City of Tampa at https://tampa.gob2g.com/, as the Availability Contact List may not be inclusive of all firms that could count toward Goal attainment. Making Good Faith Efforts through these and other means (not pro-forma) is the responsibility of the Bidder. See the attached Good Faith Effort Compliance Plan (GFECP) (DMI Form-50) for specific requirements.

GOOD FAITH EFFORT COMPLIANCE PLAN (GFECP) REQUIRED (DMI -50 FORM). When a Goal has been established, the Bidder must submit with its bid a Good Faith Effort Compliance Plan (GFECP) using the attached DMI Form-50 together with supporting documentation as specified therein. Submittals that do not contain the DMI-50 Form when a Goal has been established will be deemed non-responsive. Additional explanation and documentation is required whenever a City-certified subcontractor's quote is not utilized. Any additional information regarding GFECP (post-bid) shall be only upon the City's request for clarification of information submitted with bid and not to "cure" omissions or deficiencies of the bid.

NOTE. A prime bidder who is a City-certified SLBE is not exempt from the GFECP DMI-50 Form requirements.

[ ] SUBCONTRACTING GOAL – (DBE) FDOT DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

The City of Tampa is required to use the Florida Department of Transportation (FDOT) Disadvantaged Business Enterprise (DBE) program on contracts with Federal Highway Administration (FHWA) funds. Effective October 1, 2017 through to September 30, 2020, the overall FDOT DBE aspirational goal is 10.54% and is *race neutral*, meaning that FDOT believes the aspirational DBE goal may be achieved entirely through ordinary, competitive procurement methods. Despite the absence of a contract-specific DBE goal on this project, the City encourages bidders to seek out and use DBEs and other minority, small businesses. For assistance in identifying certified DBEs, FDOT offers the use of its supportive services program accessed via FDOT's Equal Opportunity Office at http://www.fdot.gov/equalopportunity/serviceproviders.shtm. FDOT DBE rules and regulations apply to this solicitation, including the requirement to report bidder opportunity information in the FDOT Equal Opportunity Compliance (EOC) web-based application within three (3) business days of submission of the bid for ALL subcontractors who quoted bidder for this specific project. The five (5) char/digit LAP Agreement Contract Number for this project is G_____. The web address to the EOC system is: https://fdotwp1.dot.state.fl.us/EqualOpportunityCompliance/Account.aspx/LogIn?ReturnUrl=%2fEqualOpportunityCompliance

NOTE: Regardless of FDOT DBE program applicability, for data collection purposes bidder still must submit City Forms DMI-10 and DMI-20 completed and signed with its bid or the bid will be deemed non-responsive.

DATA MANAGEMENT INITIATIVE (DMI) REPORTING FORMS REQUIRED FOR ALL CONTRACTS

Bidder must submit, with its bid, completed and signed DMI-10 and DMI-20 Forms to be considered a responsive bid. Specifically, the 'Schedule of All Solicited Sub-(Contractors/Consultants/Suppliers) (DMI-10 Form)' listing all subcontractors (including non-certified) solicited and 'Schedule of All -To Be Utilized Sub-(Contractors/Consultants/Suppliers) (DMI-20 Form)' listing all subcontractors (including non-certified) to be utilized. Supplemental forms, such as 'DMI-40 Form Official Letter Of Intent' (LOI), can be submitted with the bid or once declared the lowest-responsive bidder. After an award, the 'DMI Sub-(Contractors/Consultants/Suppliers) Payment Form (DMI-30 Form)' is to be submitted with payment requests to report payments to subcontractors and using the online automated EBO compliance software system available at https://tampa.gob2g.com/.

For additional information about the SLBE programs, contact Equal Business Opportunity at 813-274-5522.

(Rev. 08/2025)- DMI-90 FORM

Lantana-Poinsettia Stormwater Pumping Station Replacement
FY 27 Project 27-C-00004
SLBE Availability Contact List

This Certified Contact List is the minimum contacts available and may require further searches for certified firms to meet Good Fath Efforts.

#'s	Subtask	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Cert. Type
1	Electrical, Instrumentation and Controls	Above Electric LLC	813-580-1846	801-894-3084	samantha@aboveelectric.com	207 Tower Dr	Oldsmar	FL	34677	SLBE
1	Electrical, Instrumentation and Controls	Aguila Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguilaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	SLBE
1	Electrical, Instrumentation and Controls	All-In-One Electric, Inc.	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W. WATERS AVENUE	TAMPA	FL	33604	SLBE
1	Electrical, Instrumentation and Controls	Apollo Construction & Engineering Services	813-645-4926	813-645-3351	azahran@apollo-construction.com	1821 36th Street SE	Ruskin	FL	33570	SLBE
1	Electrical, Instrumentation and Controls	ARG Electric LLC	813-595-5010		alexrodriguez@argelectrics.com	4905 S West Shore Blvd	Tampa	FL	33611	SLBE
1	Electrical, Instrumentation and Controls	BSF Electric LLC	727-605-0655		bsf.electric@yahoo.com	2001 HAULOVER AVE	SPRING HILL	FL	34608	SLBE
1	Electrical, Instrumentation and Controls	Carl Hankins, Inc.	813-977-7270	813-977-5419	carlhankinsinc@tampabay.rr.com	14512 N. Nebraska Ave.	Tampa	FL	33613	SLBE
1	Electrical, Instrumentation and Controls	Crevello Electric, Inc.	813-707-6106	813-707-9633	crevelloelectric@gmail.com	2401 Procchi St	Plant City	FL	33563	SLBE
1	Electrical, Instrumentation and Controls	David Bryan Electric LLC	352-573-5156		MarianneBryan@DavidBryanElectric.com	250 Spring Time St	Spring Hill	FL	34608	SLBE
1	Electrical, Instrumentation and Controls	Electrical Handyman Services Inc	813-901-8185	813-884-5060	ehs915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	SLBE
1	Electrical, Instrumentation and Controls	Feeder Solutions LLC	813-410-3113		raul.gutierrez@bluebayelectric.com	3539 Colonial Hills Dr	Port Richey	FL	34652	SLBE
1	Electrical, Instrumentation and Controls	Fiery Watts & Life Safety LLC	813-650-1053		mlewissr@fwlsllc.net	515 West 122nd Avenue	Tampa, Florida	FL	33612	SLBE
1	Electrical, Instrumentation and Controls	Green Light Electric LLC	352-445-7726		joe@greenlightele.com	13757 49th St N	clearwater	FL	33762	SLBE
1	Electrical, Instrumentation and Controls	Harmonics Electric LLC	813-767-7722		hrodriguez@harmonicselectric.com	9217 Lazy ln	Tampa	FL	33614	SLBE
1	Electrical, Instrumentation and Controls	Leading Choice Electric LLC	813-508-7585		leadingchoiceelectric@gmail.com	13014 N Dale Mabry Hwy #364	Tampa	FL	33618	SLBE

Lantana-Poinsettia Stormwater Pumping Station Replacement
FY 27 Project 27-C-00004
SLBE Availability Contact List

#'s	Subtask	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Cert. Type
1	Electrical, Instrumentation and Controls	MCSI LLC	813-523-9559		marynesm@mymcsi.com	3023 n florida ave	Tampa	FL	33603	SLBE
1	Electrical, Instrumentation and Controls	P3 Solutions LLC	813-736-2888	813-736-2999	lpasetti@P3solutionsllc.com	5425 W Crenshaw St	Tampa	FL	33634	SLBE
1	Electrical, Instrumentation and Controls	Rick's Electrical, Inc.	813-886-2116	813-822-3385	REI@Rickselectricalinc.com	17017 Wintergreen Ct	Lutz	FL	33558	SLBE
1	Electrical, Instrumentation and Controls	S&L BUILDING SOLUTIONS, LLC	769-216-7092		slbuilding.solutions@outlook.com	8822 Indigo Trail Loop	Riverview	FL	33578	SLBE
1	Electrical, Instrumentation and Controls	Sanntidany Electric Services	813-797-2012		sanntidany@gmail.com	5618 pinnacle heights cir	TAMPA	FL	33624	SLBE
1	Electrical, Instrumentation and Controls	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atrujill@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	SLBE
1	Electrical, Instrumentation and Controls	WATERPROOFING EXPERTS, INC.	813-517-1555	813-517-1560	INFO@QUALITY-RR.COM	1907 N 40TH STREET	TAMPA	FL	33605	SLBE
2	Arc Flash	Above Electric LLC	813-580-1846	801-894-3084	samantha@aboveelectric.com	207 Tower Dr	Oldsmar	FL	34677	SLBE
2	Arc Flash	Aguila Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguilaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	SLBE
2	Arc Flash	All-In-One Electric, Inc.	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W. WATERS AVENUE	TAMPA	FL	33604	SLBE
2	Arc Flash	Apollo Construction & Engineering Services	813-645-4926	813-645-3351	azahran@apollo-construction.com	1821 36th Street SE	Ruskin	FL	33570	SLBE
2	Arc Flash	ARG Electric LLC	813-595-5010		alexrodriguez@argelectrics.com	4905 S West Shore Blvd	Tampa	FL	33611	SLBE
2	Arc Flash	BSF Electric LLC	727-605-0655		bsf.electric@yahoo.com	2001 HAULOVER AVE	SPRING HILL	FL	34608	SLBE
2	Arc Flash	Carl Hankins, Inc.	813-977-7270	813-977-5419	carlhankinsinc@tampabay.rr.com	14512 N. Nebraska Ave.	Tampa	FL	33613	SLBE
2	Arc Flash	Crevello Electric, Inc.	813-707-6106	813-707-9633	crevelloelectric@gmail.com	2401 Procchi St	Plant City	FL	33563	SLBE
2	Arc Flash	David Bryan Electric LLC	352-573-5156		MarianneBryan@DavidBryanElectric.com	250 Spring Time St	Spring Hill	FL	34608	SLBE

Lantana-Poinsettia Stormwater Pumping Station Replacement
FY 27 Project 27-C-00004
SLBE Availability Contact List

#'s	Subtask	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Cert. Type
2	Arc Flash	Electrical Handyman Services Inc	813-901-8185	813-884-5060	ehs915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	SLBE
2	Arc Flash	Feeder Solutions LLC	813-410-3113		raul.gutierrez@bluebayelectric.com	3539 Colonial Hills Dr	Port Richey	FL	34652	SLBE
2	Arc Flash	Fiery Watts & Life Safety LLC	813-650-1053		mlewissr@fwlsllc.net	515 West 122nd Avenue	Tampa, Florida	FL	33612	SLBE
2	Arc Flash	Green Light Electric LLC	352-445-7726		joe@greenlightele.com	13757 49th St N	clearwater	FL	33762	SLBE
2	Arc Flash	Harmonics Electric LLC	813-767-7722		hrodriguez@harmonicselectric.com	9217 Lazy ln	Tampa	FL	33614	SLBE
2	Arc Flash	Leading Choice Electric LLC	813-508-7585		leadingchoiceelectric@gmail.com	13014 N Dale Mabry Hwy #364	Tampa	FL	33618	SLBE
2	Arc Flash	MCSI LLC	813-523-9559		marynesm@mymcsi.com	3023 n florida ave	Tampa	FL	33603	SLBE
2	Arc Flash	P3 Solutions LLC	813-736-2888	813-736-2999	lpasetti@P3solutionsllc.com	5425 W Crenshaw St	Tampa	FL	33634	SLBE
2	Arc Flash	Rick's Electrical, Inc.	813-886-2116	813-822-3385	REI@Rickselectricalinc.com	17017 Wintergreen Ct	Lutz	FL	33558	SLBE
2	Arc Flash	S&L BUILDING SOLUTIONS, LLC	769-216-7092		slbuilding.solutions@outlook.com	8822 Indigo Trail Loop	Riverview	FL	33578	SLBE
2	Arc Flash	Sanntidany Electric Services	813-797-2012		sanntidany@gmail.com	5618 pinnacle heights cir	TAMPA	FL	33624	SLBE
2	Arc Flash	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atrujill@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	SLBE
2	Arc Flash	WATERPROOFING EXPERTS, INC.	813-517-1555	813-517-1560	INFO@QUALITY-RR.COM	1907 N 40TH STREET	TAMPA	FL	33605	SLBE
3	PICS/PLC/SCADA	Above Electric LLC	813-580-1846	801-894-3084	samantha@aboveelectric.com	207 Tower Dr	Oldsmar	FL	34677	SLBE
3	PICS/PLC/SCADA	Aguila Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguilaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	SLBE
3	PICS/PLC/SCADA	All-In-One Electric, Inc.	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W. WATERS AVENUE	TAMPA	FL	33604	SLBE
3	PICS/PLC/SCADA	Apollo Construction & Engineering Services	813-645-4926	813-645-3351	azahran@apollo-construction.com	1821 36th Street SE	Ruskin	FL	33570	SLBE

Lantana-Poinsettia Stormwater Pumping Station Replacement
FY 27 Project 27-C-00004
SLBE Availability Contact List

#'s	Subtask	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Cert. Type
3	PICS/PLC/SCADA	ARG Electric LLC	813-595-5010		alexrodriguez@argelectrics.com	4905 S West Shore Blvd	Tampa	FL	33611	SLBE
3	PICS/PLC/SCADA	BSF Electric LLC	727-605-0655		bsf.electric@yahoo.com	2001 HAULOVER AVE	SPRING HILL	FL	34608	SLBE
3	PICS/PLC/SCADA	Carl Hankins, Inc.	813-977-7270	813-977-5419	carlhankinsinc@tampabay.rr.com	14512 N. Nebraska Ave.	Tampa	FL	33613	SLBE
3	PICS/PLC/SCADA	Crevello Electric, Inc.	813-707-6106	813-707-9633	crevelloelectric@gmail.com	2401 Procchi St	Plant City	FL	33563	SLBE
3	PICS/PLC/SCADA	David Bryan Electric LLC	352-573-5156		MarianneBryan@DavidBryanElectric.com	250 Spring Time St	Spring Hill	FL	34608	SLBE
3	PICS/PLC/SCADA	Electrical Handyman Services Inc	813-901-8185	813-884-5060	ehs915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	SLBE
3	PICS/PLC/SCADA	Feeder Solutions LLC	813-410-3113		raul.gutierrez@bluebayelectric.com	3539 Colonial Hills Dr	Port Richey	FL	34652	SLBE
3	PICS/PLC/SCADA	Fiery Watts & Life Safety LLC	813-650-1053		mlewissr@fwlsllc.net	515 West 122nd Avenue	Tampa, Florida	FL	33612	SLBE
3	PICS/PLC/SCADA	Green Light Electric LLC	352-445-7726		joe@greenlightele.com	13757 49th St N	clearwater	FL	33762	SLBE
3	PICS/PLC/SCADA	Harmonics Electric LLC	813-767-7722		hrodriguez@harmonicselectric.com	9217 Lazy ln	Tampa	FL	33614	SLBE
3	PICS/PLC/SCADA	Leading Choice Electric LLC	813-508-7585		leadingchoiceelectric@gmail.com	13014 N Dale Mabry Hwy #364	Tampa	FL	33618	SLBE
3	PICS/PLC/SCADA	MCSI LLC	813-523-9559		marynesm@mymcsi.com	3023 n florida ave	Tampa	FL	33603	SLBE
3	PICS/PLC/SCADA	P3 Solutions LLC	813-736-2888	813-736-2999	lpasetti@P3solutionsllc.com	5425 W Crenshaw St	Tampa	FL	33634	SLBE
3	PICS/PLC/SCADA	Rick's Electrical, Inc.	813-886-2116	813-822-3385	REI@Rickselectricalinc.com	17017 Wintergreen Ct	Lutz	FL	33558	SLBE
3	PICS/PLC/SCADA	S&L BUILDING SOLUTIONS, LLC	769-216-7092		slbuilding.solutions@outlook.com	8822 Indigo Trail Loop	Riverview	FL	33578	SLBE
3	PICS/PLC/SCADA	Sanntidany Electric Services	813-797-2012		sanntidany@gmail.com	5618 pinnacle heights cir	TAMPA	FL	33624	SLBE
3	PICS/PLC/SCADA	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atrujill@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	SLBE

Lantana-Poinsettia Stormwater Pumping Station Replacement
FY 27 Project 27-C-00004
SLBE Availability Contact List

#'s	Subtask	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Cert. Type
4	Security System	Above Electric LLC	813-580-1846	801-894-3084	samantha@aboveelectric.com	207 Tower Dr	Oldsmar	FL	34677	SLBE
4	Security System	Aguila Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguilaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	SLBE
4	Security System	All-In-One Electric, Inc.	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W. WATERS AVENUE	TAMPA	FL	33604	SLBE
4	Security System	Apollo Construction & Engineering Services	813-645-4926	813-645-3351	azahran@apollo-construction.com	1821 36th Street SE	Ruskin	FL	33570	SLBE
4	Security System	ARG Electric LLC	813-595-5010		alexrodriguez@argelectrics.com	4905 S West Shore Blvd	Tampa	FL	33611	SLBE
4	Security System	BSF Electric LLC	727-605-0655		bsf.electric@yahoo.com	2001 HAULOVER AVE	SPRING HILL	FL	34608	SLBE
4	Security System	Carl Hankins, Inc.	813-977-7270	813-977-5419	carlhankinsinc@tampabay.rr.com	14512 N. Nebraska Ave.	Tampa	FL	33613	SLBE
4	Security System	Crevello Electric, Inc.	813-707-6106	813-707-9633	crevelloelectric@gmail.com	2401 Procchi St	Plant City	FL	33563	SLBE
4	Security System	David Bryan Electric LLC	352-573-5156		MarianneBryan@DavidBryanElectric.com	250 Spring Time St	Spring Hill	FL	34608	SLBE
4	Security System	Electrical Handyman Services Inc	813-901-8185	813-884-5060	ehs915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	SLBE
4	Security System	Feeder Solutions LLC	813-410-3113		raul.gutierrez@bluebayelectric.com	3539 Colonial Hills Dr	Port Richey	FL	34652	SLBE
4	Security System	Fiery Watts & Life Safety LLC	813-650-1053		mlewissr@fwlsllc.net	515 West 122nd Avenue	Tampa, Florida	FL	33612	SLBE
4	Security System	Florida Wind Trade Inc.	813-526-4315		floridawindtradeinc@gmail.com	9225 Bay Plaza #417	Tampa	FL	33619	SLBE
4	Security System	Green Light Electric LLC	352-445-7726		joe@greenlightele.com	13757 49th St N	clearwater	FL	33762	SLBE
4	Security System	Harmonics Electric LLC	813-767-7722		hrodriguez@harmonicselectric.com	9217 Lazy ln	Tampa	FL	33614	SLBE
4	Security System	Leading Choice Electric LLC	813-508-7585		leadingchoiceelectric@gmail.com	13014 N Dale Mabry Hwy #364	Tampa	FL	33618	SLBE

Lantana-Poinsettia Stormwater Pumping Station Replacement
FY 27 Project 27-C-00004
SLBE Availability Contact List

#'s	Subtask	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Cert. Type
4	Security System	MCSI LLC	813-523-9559		marynesm@mymcsi.com	3023 n florida ave	Tampa	FL	33603	SLBE
4	Security System	P3 Solutions LLC	813-736-2888	813-736-2999	lpasetti@P3solutionsllc.com	5425 W Crenshaw St	Tampa	FL	33634	SLBE
4	Security System	Rick's Electrical, Inc.	813-886-2116	813-822-3385	REI@Rickselectricalinc.com	17017 Wintergreen Ct	Lutz	FL	33558	SLBE
4	Security System	S&L BUILDING SOLUTIONS, LLC	769-216-7092		slbuilding.solutions@outlook.com	8822 Indigo Trail Loop	Riverview	FL	33578	SLBE
4	Security System	Sanntidany Electric Services	813-797-2012		sanntidany@gmail.com	5618 pinnacle heights cir	TAMPA	FL	33624	SLBE
4	Security System	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atrujill@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	SLBE
4	Security System	Tensus Technology LLC	833-317-3620	813-607-4700	sales@tensus.com	100 South Ashley Drive	Tampa	FL	33602	SLBE
4	Security System	WATERPROOFING EXPERTS, INC.	813-517-1555	813-517-1560	INFO@QUALITY-RR.COM	1907 N 40TH STREET	TAMPA	FL	33605	SLBE

PROPOSAL

To the Mayor and City Council of the City of Tampa, Florida:

Legal Name of Bidder: _____

Bidder's Fictitious Name*, if applicable*: _____

Bidder is a/an: ☐ Individual ☐ Partnership(attach Partnership or Joint Venture Agreement).
☐ Joint Venture* ☐ LLC ☐ Corp. ☐ Other:

Bidder is organized under the laws of: ☐ State of Florida ☐ Other: _____

Bidder Mailing Address:_____

Bidder's Federal Employee Identification No. (FEI/EIN):_____

Bidder's License No.:_____ Bidder's FDOS (SUNBIZ) Doc. No.*:* _____

(See Ch. 489. FS; use entity's, individual's <u>only</u> if applicable)

Bidder Contact Name: _____ Email:_____ Phone: _____
(Someone the City may contact with questions/correspondence regarding this Solicitation)

The below named person, appearing before the undersigned authority and after being first duly sworn, for him/herself and on behalf of the entity submitting this Proposal does hereby affirm and declare as follows:

(1) He/She is of lawful age and is authorized to act on behalf of Bidder (the individual, partnership, corporation, entity, etc. submitting this Proposal) and that all statements made in this document are true and correct to the best of my knowledge.

(2) If Bidder is operating under a fictitious name, Bidder has currently complied with any and all laws and procedures governing the operation of businesses under fictitious names in the State of Florida

(3) No person or entity other than Bidder has any interest in this Proposal or in the Contract proposed to be entered into.

Item No.	Description	Unit	Est Qty	Unit Price in Words		Unit Price		Total Price
0100-1	**Contingency**	LS	1	Eighty Thousand dollars and No Cents	$	80,000.00	$	80,000.00
LP-1	**Mobilization/Demobilization:** Including Bonds & Insurance, Maintenance of Traffic, Permitting, Survey Stake Out & As-Builts, Materials Testing, Sedimentation & Erosion Control, Site Cleanup/Restoration, and related work.	LS	1		$		$	
LP-2	**Demolition:** Including dismantling, demolishing, removal, and disposal of structures and equipment or salvage & delivery to Owner (when directed).	LS	1		$		$	
LP-3	**Concrete Structures & Flatwork:** Including earthwork, formwork, shoring/bracing, reinforcement, jointing, sealing, grouting curing and appurtenent work for concrete foundations for equipment and tanks, retaining walls, slabs, driveways, sidewalks, and related work.	LS	1		$		$	
LP-4	**Site work:** Including earthwork, grading, storm sewers, intake structure, fencing, grassing, landscaping, water service, irrigation system, equipment relocation, site restoration, and related work.	LS	1		$		$	
LP-5	**Submersible Pump Station:** Including earthwork, formwork, shoring/bracing, wetwell, top slab, pumps & controls package (furnished by Owner), discharge and force main piping, valves, fittings, tie-in to existing force main, appurtenances and related work.	LS	1		$		$	
LP-6	**Generator Set (furnished by Owner, Installed by Contractor):** Including delivery coordination, receiving, offloading, placing, securing of equipment on structural foundation.	LS	1		$		$	
LP-7	**Electrical:** Including electrical gear and rack, Automatic Transfer Switch (furnished by Owner, Installed by Contractor), Lighting, Power Monitoring, panels, conduit, conductors, appurtenances, and related work.	LS	1		$		$	
LP-8	**Arc Flash Hazard Analysis:** Including data collection, analysis, labeling and study preparation, submittal, and related work.	LS	1		$		$	
LP-9	**Instrumentation and Controls:** Including Level transmitters, Fiber and Cellular Communications new service coordination, switches, modems, appurtenances, and related work.	LS	1		$		$	
LP-10	**PICS/PLC/SCADA Programming:** Including programing, testing, documenting, training, placing into operation, and related work.	LS	1		$		$	
LP-11	**Security System:** Including Cellular Communications new service coordination, Cameras and Cellular Modem, Enclosure and Mounting pole, appurtenances, and related work.	LS	1		$		$	

TOTAL BID AMOUNT: $

(4) This Proposal is made without any understanding, agreement, or connection with any person or entity making Proposal for the same purposes, and is in all respects fair and without collusion or fraud.

(5) Bidder is not in arrears to the City of Tampa, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the City of Tampa.

(6) That no officer or employee or person whose salary is payable in whole or in part from the City Treasury is, shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this Proposal, or in the performance of the Contract, or in the supplies, materials, or equipment and work or labor to which it relates, or in any portion of the profits thereof.

(7) Bidder has carefully examined and fully understands the Solicitation and has full knowledge of the scope, nature, and quality of the work to be performed; furthermore, Bidder has carefully examined the site of the work and that, from his own investigations, he has satisfied himself as to the nature and location of the work, the character, quality, and quantity of materials and the kinds and extent of equipment and other facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, affect the work or its performance.

(8) Bidder (including its principals) ☐ has | ☐ has NOT been debarred or suspended from contracting with a public entity.

(9) Bidder ☐ has | ☐ has NOT implemented a drug-free workplace program that meets the requirements of Section 287.087, Florida Statutes.

(10) Bidder has carefully examined and fully understands all the component parts of the Contract Documents and agrees Bidder will execute the Contract, provide the required Public Construction Bond, and will fully perform the work in strict accordance with the terms of the Contract and Contract Documents therein referred to for the following prices, to wit:

A Computed Total of

_____ Dollars $_____

Bidder acknowledges that the following addenda have been received and that the changes covered by the addendum(s) have been taken into account in this proposal: #1 ____ #2 ____ #3 ____ #4 ____ #5 ____ #6 ____ #7 ____ #8 ____.

Bidder acknowledges the requirements of the City of Tampa's Equal Business Opportunity Program.

Bidder acknowledges that it is aware of Florida's Trench Safety Act (Sections 553.60-553.64, Florida Statutes), and agrees that Bidder together with any involved subcontractors will comply with all applicable trench safety standards. Bidder further acknowledges that included in the various items of this Proposal and the total bid price (as applicable) are costs for complying with the Trench Safety Act. Bidder further identifies the costs and methods summarized below:

	Trench Safety Measure (Description)	Unit of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
A.					
B.					
C.					

Total Cost: $ _____

Accompanying this Proposal is a certified check, cashier's check or Tampa Bid Bond (form included herein must be used) for at least five percent (5%) of the total amount of the Proposal which check shall become the property of the City, or which bond shall become forthwith due and payable to the City, if this Proposal shall be accepted by the City and the Bidder shall fail to enter into a legally binding

contract with and to furnish the required Public Construction Bond to the City within twenty (20) days after the date of its receipt of written Notice of Award by the City so to do.

FAILURE TO COMPLETE THE ABOVE MAY RESULT IN THE PROPOSAL BEING DECLARED NON-RESPONSIVE.

Name of Bidder:_____

Authorized Signature:_____

Signer's Printed Name:_____

Signer's Title: _____

STATE OF _____

COUNTY OF _____

The forgoing instrument was sworn (or affirmed) before me this ____ day of _____, 20___ by _____ as _____ of _____, a/n Partnership Joint Venture LLC Corp Other:_____, on behalf of such entity. Such individual is personally known to me or produced a/n _____ state driver's license as identification.

[NOTARY SEAL]

Notary Public, State of _____

Notary Printed Name: _____

Commission No.: _____

My Commission Expires: _____

ATTESTATION OF COMPLIANCE WITH FOREIGN COUNTRIES OF CONCERN PURSUANT TO SECTION 287.138, FLORIDA STATUTES, CONVICTED VENDOR LIST (PUBLIC ENTITY CRIME) PURSUANT TO SECTION 287.133, FLORIDA STATUTES, PROHIBITION AGAINST CONTRACTING WITH SCRUTINIZED COMPANIES PURSUANT TO SECTION 287.135, FLORIDA STATUTES, PROHIBITION AGAINST HUMAN TRAFFICKING PURSUANT TO SECTION 787.06, FLORIDA STATUTES, AND COMPLIANCE WITH E-VERIFY PURSUANT TO SECTION 448.095, FLORIDA STATUTES

This form must be completed by an Officer of an Entity submitting a bid, proposal, or reply to, or entering into, renewing, or extending a contract with the City of Tampa.

Public Entity Crimes

1. Officer understands that a “person” or “affiliate” who has been placed on the “convicted vendor list” following a “conviction” for a “public entity crime” (as those terms are defined in Section 287.133, Florida Statutes) for a period of 36 months following the date of being placed on the convicted vendor list, is ineligible to contract with or submit a bid, proposal or reply to contract with the City of Tampa. Business Entities placed on either the “discriminatory vendor list” or “antitrust vendor list” are ineligible to transact business with the City of Tampa.

2. Officer understands and attests that neither Officer, nor any person or affiliate of the Entity, nor the Entity have been placed on any of the above referenced vendor lists that would render the Entity ineligible to contract with or submit a bid, proposal or reply to contract with the City of Tampa.

Scrutinized Companies

3. Officer understands that pursuant to Section 287.135(2)(a), Florida Statutes, if the value of the contract is one hundred thousand dollars or more, the Entity would be ineligible to contract with or submit a bid, proposal or reply to contract with the City of Tampa if the Entity is on the “Scrutinized Companies or Other Entities that Boycott Israel List” (created pursuant to Section 215.4725, Florida Statutes); or is engaged in a boycott of Israel; or if the value of

the contract is one million dollars or more if, at the time of bidding on, submitting a proposal or reply for, or entering into or renewing a contract, the Entity is ineligible to contract with the City of Tampa if the Entity:

a. Is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in Iran Terrorism Sectors List, created pursuant to Section 215.473, Florida Statutes; or

b. Is engaged in business operations in Cuba or Syria.

4. Officer attests that neither Officer nor the Entity are on the Scrutinized Companies or Other Entities that Boycott Israel List, Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in Iran Terrorism Sectors List, nor is either engaged in a boycott of Israel, and understand that any resulting contract may be terminated for a falsification of this Attestation.

E-Verify

5. Officer understands and attests that pursuant to Section 448.095(5), Florida Statutes, the Entity must comply with Florida's E-Verify law to enter into a contract with the City of Tampa.

6. The undersigned Entity is registered with and uses the United States Department of Homeland Security's E-Verify system to verify the work authorization status of all new employees.

7. No public employer has terminated a contract with the Entity pursuant to Section 448.095(5), Florida Statutes, within the year immediately preceding the date of contracting or submitting a bid, proposal or reply to contract with the City of Tampa.

8. Entity is currently in compliance and will remain in compliance, for the duration of any contract with the City of Tampa, with all requirements of Section 448.095(5), Florida Statutes.

9. Officer understands and attests that, if there is a good faith belief that the Entity has knowingly violated Section 448.09(1), Florida Statutes, there is an obligation on the part of the City of Tampa to terminate a contract pursuant to Section 448.095(5), Florida Statutes.

10. Officer understands and attests that, if there is a good faith belief that one of Entity's subcontractor(s) has knowingly violated the Section 448.09(1), Florida Statutes, but the Entity has otherwise complied with its obligations thereunder, then the Entity will be required to immediately terminate the contract with the subcontractor in order to continue providing services to the City of Tampa.

Anti-Human Trafficking

11. Officer hereby understands and attests that the undersigned Entity does not use coercion of labor or services as those terms are defined in section 787.06(2), Florida Statutes.

12. Officer attests to the best of his/her knowledge that commodities offered to the City by the Entity have not been produced, in whole or in part, by forced labor. Any contract that the City may enter into with Entity if Entity is placed on the forced labor vendor list.

Compliance with Foreign Countries of Concern

13. Officer, on behalf of the Entity attest to the following:

a. Entity is not owned by the government of a foreign country of concern as defined in Section 287.138, Florida Statutes. (Source: § 287.138, Florida Statutes.)

b. The government of a foreign country of concern does not have a controlling interest in the Entity. (Source: § 287.138(2)(b), Florida Statutes.)

c. Entity is not organized under the laws of, and does not have a principal place of business in a foreign country of concern. (Source: § 287.138(2)(c), Florida Statutes.)

Under penalties of perjury, I declare that I have read the foregoing statement and that the facts stated in it are true.

Entity Name: _____

Officer's Printed Name: _____

Officer's Title: _____

Signature: _____

Date: _____

Bidder’s Statement Regarding Bidder's Criminal History Screening Practices:

Pursuant to Sec. 2-284. - Bidder's Criminal History Screening Practices, the bidder declares as follows:

[_] The Bidder hereby declines any discount or incentive related to Section 2-284 Bidder’s Criminal History Screening Practices.

[_] The Bidder hereby applies for applicable discount or incentive related to Section 2-284 Bidder’s Criminal History Screening Practices. The following documentation and assurances are provided:

__ Notarized past employment analysis that includes the number of disadvantaged workers the bidder has hired in the past, or, if the bidder has never hired a disadvantaged worker, an explanation that the bidder made a good faith effort to hire a disadvantaged worker: and,

__ An estimate of the number of disadvantaged workers that the bidder has hired or plans to hire if the bidder is awarded the project; and,

__ Evidence that the bidder's recruitment literature and employment policy does not include language that is disadvantageous to a disadvantaged worker.

__ Identifies, [ ]hereon [ ]in attached document, potential job opportunities under the project that may be available for disadvantaged workers if the City awards the Bidder the project; and,

__ Agrees to consider for job placement at least one otherwise qualified disadvantaged worker, to the extent a job opportunity is available, if and after the Bidder is awarded the project; or

__ The Bidder currently employs a percentage of disadvantaged workers consistent with industry standards as determined by the director of the soliciting department or designee.

Signed _____ Date _____

Name _____

Title _____

Firm _____ Form BTB-1

Failure to Complete, Sign, and Submit all Forms 10,20, & 50 MAY render the Bid or Proposal Non-Responsive

Good Faith Effort Compliance Plan (GFECP) Guidelines

for Small Local Business Enterprise Participation
City of Tampa - Equal Business Opportunity Program
(DMI 50 Form – See detailed instructions on page 3 of 3)

Contract Name_____ **Bid Date** _____

Bidder/Proposer_____

Signature_____ **Date**_____

Name_____ **Title** _____

The Compliance Plan with attachments is a true account of Good Faith Efforts (GFE) made to achieve the participation goals as specified for Small Local Business Enterprises (SLBE) on the referenced contract:

☐ **SLBE participation Goal is Not Specified for this Solicitation however participation is aspirational and GFECP is required.**

☐ **SLBE participation Goal is Met or Exceeded (refer to Goal-Set DMI-90 Form).**

☐ **SLBE participation Goal is Not Fully Achieved (refer to Goal-Set DMI-90 Form).**

For each checkbox above Bidders/Proposers shall submit DMI Forms 10 and 20 which accurately report all subcontractors solicited and all subcontractors to-be-utilized. The following list is an overview of the required baseline GFECP action steps for all bids/proposals. Furthermore, it is understood that these GFECP requirements are weighted in the compliance evaluation based on the veracity and demonstrable degree of documentation provided with the bid/proposal:

(Check applicable boxes below - Must enclose supporting documents accordingly with Qualifying Remarks)

(1) Solicited through reasonable and available means the interest of SLBEs that have the capability to perform the work of the contract. The Bidder or Proposer must solicit this interest within enough time to allow the SLBEs to respond. The Bidder or Proposer must take appropriate steps to follow up initial solicitations with interested SLBEs. □ **See DMI report forms for subcontractors solicited**. □ **See enclosed supplemental data on solicitation efforts**.

□ **Qualifying Remarks**

(2) Provided interested SLBEs with adequate, specific scope information about the plans, specifications, and requirements of the contract, including addenda, in a timely manner to assist them in responding to the requested scope identified by bidder/proposer for the solicitation**.** □ **See enclosed actual solicitations used**.
□ **Qualifying Remarks**

(3) Negotiated in good faith with interested SLBEs that have submitted bids (e.g. adjusted quantities or scale). Documentation of negotiation must include the names, addresses, and telephone numbers of SLBEs that were solicited; the date of each such solicitation; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why agreements could not be reached with SLBEs to perform the work. Additional costs involved in soliciting and using subcontractors is not a sufficient reason for a bidder/proposer's failure to meet goals or achieve participation, as long as such costs are reasonable. Bidders are not required to accept excessive quotes in order to meet the goal.
□ **DMI Utilized Forms for sub-(contractor/consultant) reflect genuine negotiations** □ **This project is an RFQ/RFP in nature and negotiationsare limited to clarifications of scope/percentages, specifications, qualifications and subs fee schedules.**
□ **See enclosed documentation**.
□ **Qualifying Remarks**

(4) Not rejecting SLBEs as being unqualified without justification based on a thorough investigation of their capabilities. The SLBEs standing within its industry, membership in specific groups, organizations / associations and political or social affiliations are not legitimate causes for rejecting or not soliciting bids to meet the goals.
□ **Not applicable**. □ **See attached justification for rejection of a subcontractor's bid or proposal**. □ **Qualifying Remarks**

(5) Made scope(s) of work available to SLBE subcontractors and suppliers; and, segmented portions of the work or material consistent with the available SLBE subcontractors and suppliers, to facilitate meeting the goal. □ **In addition, Sub-Contractors could bid on their own choice of work or trade without restriction to a pre-determined portion**. □ **See enclosed comments.**□ **Qualifying Remarks**

(6) Made good faith efforts, despite the ability or desire of Bidder/Proposer to perform the sub-tasks of a contract with its

own forces/organization. A Bidder/Proposer who desires to self-perform the sub-tasks of a contract must demonstrate good faith efforts if the goal has not been met**.** □ **Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime.** □ **Qualifying Remarks w/Documents**

(7) Segmented the portions of the work to be performed by SLBEs in order to increase the likelihood that the goals will be met. This includes, where appropriate, breaking out contract work items into economically feasible units (quantities/scale) to facilitate SLBE participation, even when the Bidder/Proposer might otherwise prefer to perform these work items with its own forces**.** □ **Sub-Contractors could bid on their own choice of work or trade without restriction to a pre- determined portion.**□ **Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime.** □ **See enclosed comments.**□ **Qualifying Remarks**

(8) Made efforts to assist interested SLBEs in obtaining bonding, lines of credit, or insurance as required by the City or contractor. □ **See enclosed documentation on initiatives undertaken and methods to accomplish**. □ **Qualifying Remarks**

(9) Made efforts to assist interested SLBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, including participation in an acceptable mentor-protégé program. □ **See enclosed documentation of initiatives and/or agreements.** □ **Qualifying Remarks**

(10) Effectively used the services of the City and other organizations that provide assistance in the recruitment and placement of SLBEs.
□ **See enclosed documentation of services engaged.** □ **Overview (attached) of tactical actions and resources employed toward recruitment**

Note: Any unsolicited information in support of your Bid/RFP Compliance must accompany your submittal. □ **Identify Information Submitted**

Participation Plan: Guidance for Complying with Good Faith Efforts Outreach (page 3 of 3)

(1) All firms on the SLBE Goal Setting List must be solicited and documentation provided for email, fax, letters, phone calls, and other methods of outreach/communication with the listed firms. The DMI Solicited and DMI-Utilized forms must be completed for all firms solicited and all firms utilized. Other opportunities for subcontracting should be explored to attain participation. May consult Tampa EBO Office and/or research the online Data Management Business System Directory for Tampa certified SLBE firms.

(2) Solicitation of SLBEs, via written or electronic notification, should provide specific information on the services needed, where plans can be reviewed and assistance offered in obtaining these, if required. Solicitations should be sent a minimum of a week (i.e. 5 city business days or more) before the bid/proposal date. Actual copies of the bidder's solicitation containing their scope-specific instructions should be provided.

(3) With any quotes received, a follow-up should be made when needed to confirm detail scope of work. For anySLBE low quotes rejected, an explanation shall be provided detailing negotiation efforts.

(4) If a low bid SLBE is rejected or deemed unqualified the contractor must provide an explanation and supporting documentation for this decision.

(5) Prime shall break down portions of work into economical feasible opportunities for subcontracting. The SLBE directory may be useful in identifying additional subcontracting opportunities and certified firms not listed in the "SLBE Goal Setting Firms Contact List."

(6) Contractor shall not preclude SLBEs from bidding on any part of work, even if the Contractor may desire to self-perform aspects of the work.

(7) Contractor shall avoid relying solely on subcontracting those scopes of work where SLBE availabilityis not sufficient to attain pre-determined goals; including RFP/RFQ solicitations, all of which require GFECP compliance to achieve sub-consultant participation.

(8) In its solicitations, the Bidder should offer assistance to SLBEs in obtaining bonding, insurance, et cetera, if required of subcontractors by the City or Prime Contractor.

(9) In its solicitation, the Bidder should offer assistance in obtaining equipment for a specific job to SLBEs, if needed. This includes mobilization where applicable.

(10) Contractor should use the services offered by such agencies as the Small Business Development Center (SBDC) @ University South Fla.; SBDC @ Hillsborough County Entrepreneur Collaborative Center; Hillsborough NAACP Empowerment Center; Hillsborough County Economic Development Department DM/DWBE/SBE Program and Prospera-Hispanic Business Assoc. to name a few for the recruitment and placement of available SLBEs.

Failure to Complete, Sign and Submit Forms 10, 20, & 50 MAY render the Bid or Proposal Non-Responsive

Page 1 of 2 – DMI Solicited/Utilized Schedules

City of Tampa – Schedule of All Solicited Sub-(Contractors/Consultants/Suppliers)

(DMI 10 Form)

Contract No.:_____ Contract Name:_____

Company Name:_____ Address:_____

Federal ID:_____ Phone:_____ Fax:_____ Email:_____

Check applicable box(es). Detailed Instructions for completing this form are on page 2 of 4.

[] No Firms were contacted or solicited for this contract.

[] No Firms were contacted because:_____

[] See attached list of additional Firms solicited and all supplemental information (List must comply with this form)

Note: Form DMI-10 must list ALL subcontractors solicited

NIGP Code Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

S = SLBE O = Neither Federal ID	Company Name Address Phone, Fax, Email	Trade or Services NIGP Code (listed above)	Contact Method L=Letter F=Fax E=Email P=Phone	Quote or Response Received Y/N

It is hereby certified that the information provided is an accurate and true account of contacts and solicitations for subcontracting opportunities on this contract.

Signed:_____ Name/Title:_____ Date:_____

Failure to Complete, Sign and Submit Forms 10, 20, & 50 MAY render the Bid or Proposal Non-Responsive

Forms must be included with Bid / Proposal

Instructions for completing The Sub- (Contractor's/Consultants/ Suppliers) Solicited Form
(DMI 10 Form)

This form must be submitted with all bids or proposals. **All** subcontractors (regardless of ownership or size) solicited and subcontractors from whom unsolicited quotations were received must be included in this form. The instructions that follow correspond to the headings on the form required to be completed. Note: Ability or desire to perform all work shall not exempt the prime from Good Faith Efforts to achieve participation.

Contract No. This is the number assigned by the City of Tampa for the proposal.

- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba), if applicable.
- **Address.** The physical address of your business.
- **Federal ID.** FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact the business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Firms were contacted or solicited for this contract.** Checking the box indicates that a pre-determined Subcontract Goal or Participation Plan Requirement was not set by the city, resulting in your business not using subcontractors and will self-perform all work. If, during the performance of the contract, you employ subcontractors, the City must pre-approve subcontractors. Use of the "Sub-(Contractors/Consultants/Suppliers) Payments" form (DMI 30 Form) must be submitted with every pay application and invoice. Note: Certified SLBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors.
- **No Firms were contacted because.** Provide a brief explanation of why no firms were contacted or solicited.
- **See attached documents.** Check the box if, after you have completed the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the form. All DMI data not submitted on the DMI 10 Form must be in the same format and include all the requested data from the DMI 10 Form.

The following instructions are for the information of all subcontractors solicited.

- **"S" = SLBE.** Enter "**S**" for firms Certified by the City as Small Local Business Enterprises; **"O" = non-certified others**.
- **Federal ID.** FIN. A number assigned to a business for tax reporting purposes. This information is critical in the proper identification and payment of the contractor/subcontractor.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Trade, Services, or Materials** indicate the trade, service, or materials provided by the subcontractor. NIGP codes, aka "National Institute of Governmental Purchasing," are listed in the top section of the document.
- **Contact Method L=letter, F=fax, E=Email, P=Phone.** Indicate with a letter the method(s) of soliciting for bids.
- Q**uote or Resp. (response) Rec'd (received) Y/N**. Indicate "Y" Yes if you received a quotation or if you received a response to your solicitation. Indicate "N" No if you received no response to your solicitation from the subcontractor. Must keep records: log, ledger, documentation, etc. that can validate/verify.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Office of Equal Business Opportunity at (813) 274-5522.

Failure to Complete, Sign, and Submit Forms 10, 20, & 50 MAY render the Bid or Proposal Non-Responsive

Page 1 of 2 – DMI Solicited/Utilized Schedules

City of Tampa – Schedule of All To-Be-Utilized Sub-(Contractors/Consultants/Suppliers)

(DMI 20 Form)

Contract No.:_____ Contract Name:_____

Company Name:_____Address:_____

Federal ID:_____ Phone:_____ Fax:_____ Email:_____

Check applicable box(es). Detailed Instructions for completing this form are on page 4 of 4.

[] See attached list of additional Firms Utilized and all supplemental information (List must comply with this form)

Note: Form DMI-20 must list ALL subcontractors To-Be-Utilized.

[] No Subcontracting/consulting (of any kind) will be performed on this contract.

[] No Firms are listed to be utilized because:_____

NIGP Code General Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

Enter "S" for firms Certified as Small Local Business Enterprises: "O" for Other Non-Certified

S = SLBE O =Neither Federal ID	Company Name Address Phone, Fax, Email	Trade, Services or Materials NIGP Code Listed above	$ Amount of Quote. Letter of Intent (LOI) if available	Percent of Scope or Contract %

Total ALL Subcontract / Supplier Utilization $_____

Total SLBE Utilization $ _____

Percent SLBE Utilization of Total Bid/Proposal Amt. _____%

It is hereby certified that the following information is a true and accurate account of utilization for sub-contracting opportunities on this Contract.

Signed:_____ Name/Title:_____ Date:_____

Failure to Complete, Sign and Submit Forms 10, 20, & 50 MAY render the Bid or Proposal Non-Responsive Forms must be included with Bid / Proposal

Instructions for completing The Sub- (Contractor's/Consultants/ Suppliers) to be Utilized Form

(DMI 20 Form)

This form must be submitted with all bids or proposals. All subcontractors (regardless of ownership or size) projected to be utilized must be included in this form.

- **Contract No.** This is the number assigned by the City of Tampa for the proposal.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba) if applicable.
- **Address.** The physical address of your business.
- **Federal ID.** FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact the business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Subcontracting/consulting (of any kind) will be performed on this contract.** Checking the box indicates your business will not use subcontractors when no Subcontract Goal or Participation Plan Requirement was set by the city but will self-perform all work. When subcontractors are utilized during the performance of the contract, the "Sub-(Contractors/Consultants/Suppliers) Payments" form (DMI 30 Form) must be submitted with every pay application and invoice. Note: Certified SLBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors, including completion and submission of Form-10 and Form-20.
- **No Firms listed To-Be-Utilized.** Check box: provide a brief explanation why no firms were retained when a goal or participation plan requirement was set on the contract. **Note: Mandatory compliance with Good Faith Effort outreach (GFECP) requirements applies (DMI 50 Form), and supporting documentation must accompany the bid.**
- **See attached documents.** Check the box if, after completing the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the scope/value/percent utilization of subcontractors. Reproduce copies of DMI-20 and attach. All data not submitted on duplicate forms must be in the same format and content as specified in these instructions.

The following instructions are for the information of all subcontractors To Be Utilized.

- **Federal ID.** FIN. A number assigned to a business for tax reporting purposes. This information is critical in the proper identification of the subcontractor.
- **"S" = SLBE,** enter "**S**" for firms Certified by the City as Small Local Business Enterprises; **"O" = non-certified others**.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Trade, Services, or Materials (NIGP code if known).** Indicate the trade, service, or material provided by the subcontractor. Abbreviated list of NIGP is available at http:/www.tampagov.net/DMI "Information Resources".
- **Amount of Quote, Letters of Intent** (required for SLBEs).
- **Percent of Work/Contract.** Indicate the percentage of the total contract price the subcontract(s) represent. For CCNA only (i.e., Consultant A/E Services), you must indicate subcontracts as a percentage of the total scope/contract.
- **Total Subcontract/Supplier Utilization.** – Provide the total dollar amount of all subcontractors/suppliers projected to be used for the contract. (Dollar amounts may be optional in CCNA depending on solicitation format).
- **Total SLBE Utilization.** Provide the total dollar amount for all projected SLBE subcontractors/Suppliers used for this contract. (Dollar amounts may be optional in CCNA proposals depending on the solicitation format).
- **Percent SLBE Utilization.** Total amount allocated to SLBEs divided by the total bid/proposal amount.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Office of Equal Business Opportunity at (813) 274-5522.

TAMPA BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____

(hereinafter called the Principal) and _____

(hereinafter called the Surety) a Corporation chartered and existing under the laws of the State of _____, with its principal offices in the City of _____, and authorized to do business in the State of Florida, are held and firmly bound unto the City of Tampa, a Municipal Corporation of Hillsborough County, Florida, in the full and just sum of 5% of the amount of the (Bid) (Proposal) good and lawful money of the United States of America, to be paid upon demand of the City of Tampa, Florida, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally and firmly these presents.

WHEREAS, the Principal is about to submit, or has submitted to the City of Tampa, Florida, a Proposal for the construction of certain facilities for the City designated Contract 27-C-00004, Lantana-Poinsettia Stormwater Pumping Station Replacement.

WHEREAS, the Principal desires to file this Bond in accordance with law, in lieu of a certified Bidder's check otherwise required to accompany this Proposal.

NOW, THEREFORE: The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within twenty (20) days after the date of receipt of written Notice of Award, execute a contract in accordance with the Proposal and upon the terms, conditions and price set forth therein, in the form and manner required by the City of Tampa, Florida and execute a sufficient and satisfactory Public Construction Bond payable to the City of Tampa, Florida in an amount of one hundred percent (100%) of the total contract price, in form and with security satisfactory to said City, then this Bid Bond obligation is to be void; otherwise to be and remain in full force and virtue in law, and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid City, upon demand,

the amount thereof, in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20___.

Principal _____

BY _____

TITLE _____

BY _____

TITLE _____

SEAL)

_____

Producing Agent

_____

Producing Agent's Address

_____

Name of Agency

_____

The addition of such phrases as "not to exceed" or like import shall render the (Bid) (Proposal)non-responsive.

BB-1

AGREEMENT Form

For furnishing all labor, materials and equipment, together with all work incidental thereto, necessary and required for the performance of the work for the construction of Contract 27-C-00004 in accordance with your Proposal dated _____, amounting to a total of $_____ as completed in accordance with subsections I-2.09 and I-2.10 of the Instruction to Bidders.

This AGREEMENT, made and entered into in triplicate, between the City of Tampa, Florida, hereinafter called the City, and _____ hereinafter called the Contractor, as of the _____ day of _____, 20___ when the City Council of the City of Tampa, Florida adopted a Resolution authorizing, among other things, the Mayor's execution of this Agreement.

WITNESSETH that, in consideration of the mutual stipulations, agreements, and covenants herein contained, the parties hereto have agreed and hereby agree with each other, the Party of the First Part for itself, its successors and assigns, and the Party of the Second Part for itself, or himself, or themselves, and its successors and assigns, or his or their executors, administrators and assigns, as follows:

Contract 27-C-00004; Lantana-Poinsettia Stormwater Pumping Station Replacement, shall include, but not be limited to, regrading of the existing stormwater pond, stormwater infrastructure improvements, construction of a new stormwater pump station including concrete wet well, related structural concrete slabs, concrete sidewalks and related site work, installation of an owner/vendor supplied pump package, owner/vendor supplied permanent genset, all related electrical equipment, controls and instrumentation, communications systems, improved security system features with all associated work required for a complete project in accordance with the Contract Documents.

Contract Documents referred to in Article 1.01 of this Agreement also includes this volume, applicable standard drawings, the plans and any provisions referred to whether actually attached or not.

IN WITNESS THEREOF, the parties have hereunto set their hands and seals, and such of them as are corporation have caused these present to be signed by their duly authorized officers.

CITY OF TAMPA, FLORIDA

_____

Jane Castor, Mayor

(SEAL)

ATTEST:

_____

City Clerk

Approved as to Form: The execution of this document was authorized by Resolution No. _____

Justin R. Vaske e/s

Justin R. Vaske, Senior Assistant City Attorney

Contractor _____

By:_____

ATTEST:

_____

Witness

TAMPA AGREEMENT

SECTION 1

GENERAL

ARTICLE 1.01 THE CONTRACT

Except for titles, subtitles, headings, running headlines, and tables of contents (all of which are printed herein merely for convenience), the following, except for such portions thereof as may be specifically excluded, constitute the Contract:

The Notice to Bidders;

The Instructions to Bidders, including Special Instructions and General Instructions;

The Proposal;

The Bid Bond;

The Certification of Nonsegregated Facilities;

The Notice of Award;

The Agreement;

The Public Construction Bond;

The Notice To Proceed;

The Specifications, including the General Provisions, the Workmanship and Materials, the Specific Provisions or the Contract Items

The Plans;

All Supplementary Drawings Issued after award of the Contract;

All Addenda issued by the City prior to the receipt of proposals;

All provisions required by law to be inserted in this Contract, whether actually inserted or not.

ARTICLE 1.02 DEFINITIONS

The following words and terms, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless different meaning is clear from the context:

(a)"City" shall mean the City of Tampa, Florida, represented by its Mayor and City Council, Party of the First Part, or such other City official as shall be duly empowered to act for the City on matters relating to this Contract.

(b)"Contractor" shall mean the Party of the Second Part hereto, whether corporation, firm or individual, or any combination thereof, and its, their, or his successors, personal representatives, executors, administrators, and assigns, and any person, firm or corporation who or which shall at any time be substituted in the place of the Party of the Second Part under this Contract.

(c)"Engineer" shall mean the Director of the Department or his duly authorized representative.

(d)"Consultant" shall mean the engineering or architectural firm or individual employed by the City to consult with and advise the City in the construction of the project.

(e)"Surety" shall mean any person, firm or corporation that has executed as Surety the Contractor's Performance Bond securing the performance of this Contact.

(f)"The Work" shall mean everything expressly or implied required to be furnished and done by the Contractor under the Contract, and shall include both Contract Work and Extra Work.

(g)"Contract Work" shall mean everything expressly or implied required to be furnished and done by the Contractor by any one or more of the Contract parts referred to in Article 1.01 hereof, except Extra Work, as hereinafter defined; it being understood that, in case of any inconsistency in or between any part or parts of this Contract, the Engineer shall determine which shall prevail.

(h)"Contract" or "Contract Documents" shall mean each of the various part of the Contract referred to in Article 1.01 hereof, both as a whole and severally.

(i)"Extra Work" shall mean work other than that required either expressly or implied by the contract in its present form.

(j)"Plans" shall mean only those drawings specifically referred to as such in these documents, or in any Addendum. Drawings issued after the execution of the Contract to explain further, or to illustrate, or to show changes in the work, will be known as "Supplementary Drawings" and shall be binding upon the Contractor with the same force as the Plans.

(k)"Specifications" shall mean all of the directions, requirements, and standards of performance applying to the work, as hereinafter detailed and designated as such, or which may be issued in an addendum.

(l)"Addendum or Addenda" shall mean the additional contract provisions issued in writing prior to the receipt of bids.

(m)"Notice" shall mean written notice. Notice shall be served upon the Contractor, either personally or by leaving the said notice at his residence or with any employee found on the work, or addressed to the Contractor at the residence or place of business given in his proposal and deposited in a postpaid wrapper in any post office box regularly maintained by the United States Post Office.

(n)"Project" shall mean the entire improvement package or related work. The "project" may consist of several different, but related, contracts.

(o)"Site" shall mean, and be limited to, the area upon or in which the Contractor's operations are carried on and such other appropriate areas as may be designed as such by the Engineer.

(p)"Subcontractor" shall mean any person, firm, or corporation, other than employees of the Contractor, who or which contracts with the Contractor to furnish, or actually furnishes labor, or labor and materials, or labor and equipment or labor, materials, and equipment at the site.

(q)Whenever in the Contract the words "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import are used, they shall imply the direction, requirement, permission, order, designation, or prescription of the Engineer; and "approved", "acceptable", "satisfactory", "in the judgement of", and words of like import shall mean approved by, or acceptable to, or satisfactory to, or in the judgment of the Engineer.

(r)Whenever in the Contract the word "day" is used, it shall mean calendar day.

(s)"Final Acceptance" shall mean acceptance of the work as evidenced by an official resolution of the City. Such acceptance shall be deemed to have taken place only if and when an approving resolution has been adopted by the City Council. The final acceptance shall be signed only after the City has assured itself by tests, inspection, or otherwise, that all of the provisions of the Contract have been carried out to its satisfaction.

(t)"Eastern Standard Time" shall be construed as the time being observed in the City on the day proposals are received or other documents issued or signed.

SECTION 2

POWERS OF THE CITY'S REPRESENTATIVES

ARTICLE 2.01 THE ENGINEER

It is covenanted and agreed that the Engineer, in addition to those matters elsewhere herein expressly made subject to his determination, direction, or approval, shall have the power, subject to such express provisions and limitations herein contained as are not in conflict herewith, and subject to review by the Mayor and City Council:

(a)To monitor the performance of the work.

(b)To determine the amount, kind, quality, sequence, and location of the work to be paid for hereunder and, when completed, to measure such work for payment.

(c)To determine all questions of an engineering character in relation to the work, to interpret the Plans, Specifications and Addenda.

(d)To determine how the work of this Contract shall be coordinated with the work of other contractors engaged simultaneously on this project.

(e)To make minor changes in the work as he deems necessary, provided such changes do not result in a net increase in the cost to the City or to the Contractor of the work to be done under the Contract.

(f)To amplify the Plans, add explanatory information and furnish additional Specifications and Drawings consistent with the intent of the Contract Documents.

The power of the Engineer shall not be limited to the foregoing enumeration, for it is the intent of this Contract that all of the work shall be subject to his determinations and approval, except where the determination or approval of someone other than the Engineer is expressly called for herein and except as subject to review by the Mayor and City Council. All orders of the Engineer requiring the Contractor to perform work as Contract work shall be promptly obeyed by the Contractor.

The Engineer shall not, however, have the power to issue an extra work order, and the performance of such work on the order of the Engineer without previously obtaining written confirmation thereof from the Mayor in accordance with Article 7.02 hereof may constitute a waiver of any right to extra compensation therefor. The Contractor is warned that the Engineer has no power to change the terms and provisions of this Contract, except minor changes where such change results in no net increase in the Contract Price.

ARTICLE 2.02 DIRECTOR

The Director of the Department in addition to those matters expressly made subject to his determination, direction or approval in his capacity as "Engineer", shall also have the power:

(a)To review any and all questions in relation to this Contract and its performance, except as herein otherwise specifically provided, and his determination upon such review shall be final and conclusive upon the Contractor.

(b)With the approval of the Mayor and City Council to authorize modifications or changes in the Contract so as to require: (1) the performance of extra work, or (2) the omission of Contract work whenever he deems it in the interest of the City to do so, or both.

(c)To suspend the whole or any part of the work whenever, in his judgment, such suspension is required: (1) in the interest of the City generally, or (2) to coordinate the work of the various Contractors engaged on this project, or (3) to expedite the completion of the entire project, even though the completion of this particular Contract may be thereby delayed, without compensation to the Contractor for such suspension other than extending the time for the completion of the work, as much as it may have been, in the opinion of the City, delayed by such a suspension.

(d)If, before the final acceptance of all the work contemplated herein, it shall be deemed necessary to take over, use, occupy, or operate any part of the completed or partly completed work, the Engineer shall have the right to do so and the Contractor will not, in any way, interfere with or object to the use, occupation, or operation of such work by the City after receipt of notice in writing from the Engineer that such work or part thereof will be used by the City on and after the date specified in such notice. Such taking over, use, occupancy or operation of any part of the completed or partially completed work shall not constitute final acceptance or approval of any such part of the work.

ARTICLE 2.03 NO ESTOPPEL

The City shall not, nor shall any department, officer, agent, or employee thereof, be bound, precluded, or estopped by any determination, decision, acceptance, return, certificate, or payment made or given under or in connection with this Contract by any officer, agent or employee of the City at any time either before or after final completion and acceptance of the work and payment therefor: (a) from showing the true and correct classification, amount, quality, or character of the work done, or that any determination, decision, acceptance, return certificate or payment is untrue, incorrect or improperly made in any particular, or that the work or any part thereof does not in fact conform to the requirements of the Contract Documents, and (b) from demanding and recovering from the Contractor any overpayments made to him or such damages as it may sustain by reason his failure to comply with

the requirements of the Contract of Documents, or both.

ARTICLE 2.04 NO WAIVER OF RIGHTS

Neither the inspection, nor any order, measurements or certificate of the City or its employees, officers, or agents, nor by any order of the City for payment of money, nor any money, nor payments for or acceptance of the whole or any part of the work by the City, nor any extension of time, nor any changes in the Contract, Specifications or Plans, nor any possession by the City or its employees shall operate as a waiver of any provisions of this Contract, nor any power herein provided nor shall any waiver of any breach of this Contract be held as a waiver of any other subsequent breach.

Any remedy provided in this Contract shall be taken and construed as cumulative, namely, in addition to each and every other suit, action, or legal proceeding. The City shall be entitled as of right to an injunction against any breach of the provisions of this Contract.

SECTION 3

PERFORMANCE OF WORK

ARTICLE 3.01 CONTRACTOR'S RESPONSIBILITY

The Contractor shall do all the work and furnish, at his own cost and expense, all labor, materials, equipment, and other facilities, except as herein otherwise provided, as may be necessary and proper for performing and completing the work under this Contract. The Contractor shall be responsible for the entire work until completed and finally accepted by the City.

The work shall be performed in accordance with the true intent and meaning of the Contract Documents. Unless otherwise expressly provided, the work must be performed in accordance with the best modern practice, with materials as specified and workmanship of the highest quality, all as determined by and entirely to the satisfaction of the Engineer.

Unless otherwise expressly provided, the means and methods of construction shall be such as the Contractor may choose, subject, however, to the approval of the Engineer. Only adequate and safe procedure, methods, structures and equipment shall be used. The Engineer's approval or the Engineer's failure to exercise his right thereon shall not relieve the Contractor of obligations to accomplish the result intended by the Contract, nor shall such create a cause of action for damages.

ARTICLE 3.02 COMPLIANCE WITH LAWS

The Contractor must comply with all local, State and Federal laws, rules, ordinances and regulations applicable to this Contract and to the work done hereunder, and must obtain, at his own expense, all

permits, licenses or other authorization necessary for the prosecution of the work.

No work shall be performed under this Contract on Sundays, legal holidays or after regular working hours without the express permission of the Engineer. Where such permission is granted, the Engineer may require that such work be performed without additional expense to the City.

ARTICLE 3.03 INSPECTION

During the progress of the work and up to the date of final acceptance, the Contractor shall, at all times, afford the representatives of the City, the Florida Department of Environmental Regulation, and if applicable, the Federal Environmental Protection Agency and the Federal Department of Labor every reasonable, safe and proper facility for inspecting the work done or being done at the site. The inspection of any work shall not relieve the Contractor of any of his obligations to perform proper and satisfactory work as herein specified. Finished or unfinished work found not to be in strict accordance with the Contract shall be replaced as directed by the Engineer, even though such work may have been previously approved and payment made therefor.

The City shall have the right to reject materials and workmanship which are defective or require their correction. Rejected work and materials must be promptly removed from the site, which must at all times be kept in a reasonably clean and neat condition.

Failure or neglect on the part of the City to condemn or reject bad or inferior work or materials shall not be construed to imply an acceptance of such work or materials, if it becomes evident at any time prior to the final acceptance of the work by the City. Neither shall it be construed as barring the City at any subsequent time from the recovery of damages of such a sum of money as may be needed to build anew all portions of the work in which inferior work or improper materials were used, wherever found.

Should it be considered necessary or advisable by the City at any time before final acceptance of the entire work to make examinations of work already completed, by removing or tearing out all or portions of such work, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material for that purpose. If such work is found to be defective in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the work shall be considered an item of extra work to be paid for in accordance with the provisions of Article 7.02 hereof.

ARTICLE 3.04 PROTECTION

During performance and until final acceptance, the Contractor shall be under an absolute obligation to protect the finished and unfinished work against any damage, loss, or injury. The Contractor shall take proper precaution to protect the finished work from loss or damage, pending completion and the final acceptance of all the work included in the entire Contract, provided that such precaution shall not relieve the Contractor from any and all liability and responsibility for loss or damage to the work occurring before final acceptance by the City. Such loss or damage shall be at the risk of and borne by the Contractor, whether arising from acts or omissions of the Contractor or others. In the event of any such loss or damage, the Contractor shall forthwith repair, replace, and make good the work without extension of time therefor, except as may be otherwise provided herein.

The provisions of this Article shall not be deemed to create any new right of action in favor of third parties against the Contractor or the City.

ARTICLE 3.05 PRESERVATION OF PROPERTY

The Contractor shall preserve from damage all property along the line of the work, or which is in the vicinity of or is in anywise affected by the work, the removal or destruction of which is not called for by the Plans. This applies, but is not limited, to the public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, public streets (except natural wear and tear of streets resulting from legitimate use thereof by the Contractor), and wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition by the Contractor and at his own expense.

In case of failure on the part of the Contractor to restore such property, or make good such damage or injury, the City may, upon forty-eight (48) hour written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract. Nothing in this clause shall prevent the Contractor from receiving proper compensation for the removal, damage, or replacement of any public or private property not shown on the Plans, when this is made necessary by alteration of grade or alignment authorized by the Engineer, provided that such property has not been damaged through fault of the Contractor, his employees or agents.

ARTICLE 3.06 BOUNDARIES

The Contractor shall confine his equipment, apparatus, the storage of materials, supplies and apparatus of his workmen to the limits indicated on the plans, by law, ordinances, permits or direction of the Engineer.

ARTICLE 3.07 SAFETY AND HEALTH REGULATIONS

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL91-54).

ARTICLE 3.08 TAXES

All taxes of any kind and character payable on account of the work done and materials furnished under this Contract shall be paid by the Contractor and shall be deemed to have been included in his bid. The laws of the State of Florida provide that sales and use taxes are payable by the Contractor upon the tangible personal property incorporated in the work and such taxes shall be paid by the Contractor and shall be deemed to have been included in his bid.

ARTICLE 3.09 ENVIRONMENTAL CONSIDERATIONS

The Contractor, in the performance of the work under this Contract, shall comply with all Local, State and Federal laws, statutes, ordinances, rules and regulations applicable to protection of the environment; and, in the event he violates any of the provisions of same, he shall be answerable to the Local, State and Federal agencies designated by law to protect the environment. In the event the City receives, from any of the environmental agencies, a citation which is occasioned by an act or omission of the Contractor or his subcontractor or any officers, employees or agents of either, it is understood and agreed that the Contractor shall automatically become a party-respondent under said citation; and the City immediately shall notify the Contractor and provide him with a copy of said citation.

The Contractor shall comply with the requirements of the citation and correct the offending conditions(s) within the time stated in said citation and further shall be held fully responsible for all fines and/or penalties.

SECTION 4

TIME PROVISIONS

ARTICLE 4.01 TIME OF START AND COMPLETION

The Contractor must commence work within thirty (30) days subsequent to the date of the receipt of the "Notice to Proceed" by the City unless otherwise provided in the Specific Provisions and Special Instructions. Time being of the essence of this Contract, the Contractor shall thereafter prosecute the work diligently, using such means and methods of construction as well as secure its full completion in accordance with the requirements of the Contract Documents no later than the date specified therefor, or on the date to which the time for completion may be extended.

The Contractor must complete the work covered by this Contract in the number of consecutive calendar days set forth in the Instructions to Bidders, unless the date of completion is extended pursuant to the provisions of Article 4.05 hereof. The period for performance shall start from the date of signing of this Agreement by the City.

The actual date of completion will be established after a final inspection as provided in Article 4.07 hereof.

ARTICLE 4.02 PROGRESS SCHEDULE

To enable the work to be laid out and prosecuted in an orderly and expeditious manner, the Contractor shall submit to the Engineer a proposed progress schedule within fifteen (15) days after the award of this Contract.

The schedule shall state the Contract starting date, time for completion and date of completion and shall show the anticipated time of starting and completion of each of the various operations to be performed under this Contract, together with all necessary and appropriate information regarding sequence and correlation of work and an estimated time required for the delivery of all materials and equipment required for the work. The proposed schedule shall be revised as directed by the Engineer until finally approved by him, and, after such approval, shall be strictly adhered to by the Contractor. The approved progress schedule may be changed only with the written permission of the Engineer.

If the Contractor shall fail to adhere to the approved progress schedule or the schedule as revised, he shall promptly adopt such other or additional means and methods of construction as will make up for the time lost, and will assure completion in accordance with the contract time.

ARTICLE 4.03 APPROVAL REQUESTS

From time to time, as the work progresses and in the sequence indicated by the approved schedule, the Contractor must submit to the Engineer a specific request, in writing, for each item of information or approval required of him by the Contract. These requests must be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow for the time the Engineer may take to act upon such submissions or resubmissions. The Contractor shall not have any right to an extension of time on account of delays due to his failure to submit his requests for the required information or the required approval in accordance with these requirements.

ARTICLE 4.04 COORDINATION WITH OTHER CONTRACTORS

During progress of the work, other Contractors may be engaged in performing other work on this project or on other projects on the site. In that event, the Contractor shall coordinate the work to be

done hereunder with the work of such other Contractors in such manner as the Engineer may direct.

ARTICLE 4.05 EXTENSION OF TIME

If such an application is made, the Contractor shall be entitled to an extension of time for delay in completion of the work should the Contractor be obstructed or delayed in the commencement, prosecution or completion of any part of said work by any act or delay of the City, or by acts or omissions of other Contractors on this project, or by a riot, insurrection, war, pestilence, acts of public authorities, fire, lightning, hurricanes, earthquakes, tornadoes, floods, extremely abnormal and excessive inclement weather as indicated by the records of the local weather bureau for a five-year period preceding the date of the Contract, or by strikes, or other causes, which causes of delay mentioned in this Article, in the opinion of the City, are entirely beyond the expectation and control of the Contractor.

The Contractor shall, however, be entitled to an extension of time for such causes only for the number of days of delay which the City may determine to be due solely to such causes and only to the extent that such occurrences actually delay the completion of the project and then only if the Contractor shall have strictly complied with all of the requirements of Articles 4.01, 4.02, 4.03 and 4.04 hereof. It is hereby understood that the determination by the Engineer as to the order and sequence of the work shall not in itself constitute a basis for extension of time.

The determination made by the City on an application for an extension of time shall be binding and conclusive on the Contractor.

Delays caused by failure of the Contractor's materialmen, manufacturers, and dealers to furnish approved working drawings, materials, fixtures, equipment, appliances, or other fittings on time or failure of subcontractors to perform their work shall not constitute a basis of extension of time.

The Contractor agrees to make no claim for damages for delay in the performance of this Contract occasioned by any act or omission to act of the City or any of its representatives or because of any injunction which may be brought against the City or its representatives and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the work as provided herein.

ARTICLE 4.06 LIQUIDATED DAMAGES

It is mutually agreed between the parties that time is the essence of this Contract and that there will be on the part of the City considerable monetary damage in the event the Contractor should fail to complete the work within the time fixed for completion in the Contract or within the time to which such completion may have been extended.

The amount per day set forth in the Instructions to Bidders is hereby agreed upon as the liquidated damages for each and every calendar day that the time consumed in completing the work under this Contract exceeds the time allowed.

This amount shall, in no event, be considered as a penalty or otherwise than as the liquidated and adjusted damages to the City because of the delay and the Contractor and his Surety agree that the stated sum per day for each such day of delay shall be deducted and retained out of the monies which may become due hereunder and if not so deductible, the Contractor and his Surety shall be liable therefor.

ARTICLE 4.07 FINAL INSPECTION

When the work has been completed in accordance with the requirements of the Contract and final cleaning up performed, a date for final inspection of the work by the Engineer shall be set by the Contractor in a written request therefor, which date shall be not less than ten (10) days after the date of such request. The work will be deemed complete as of the date so set by the Contractor if, upon such inspection, the Engineer determines that no further work remains to be done at the site.

If such inspection reveals interms of work still to be performed, however, the Contractor shall promptly perform them and then request a reinspection. If, upon such inspection, the Engineer determines that the work is complete, the date of final completion shall be deemed to be the last day of such reinspection.

SECTION 5

SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 5.01 LIMITATIONS AND CONSENT

The Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due thereunder to any other person, firm or corporation unless the previous written consent of the City shall first be obtained thereto and the giving of any such consent to a particular subcontract or assignment shall not dispense with the necessity of such consent to any further or other assignment.

Before making any subcontract, the Contractor must submit a written statement to the Engineer, giving the name and address of the proposed contractor, the portion of the work and materials which he is to perform and furnish and any other information tending to prove that the proposed subcontractor has the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and conditions of this Contract.

If the City finds that the proposed subcontractor is qualified, the Contractor will be notified in writing. The City may revoke approval of any subcontractor when such subcontractor evidences an unwillingness or inability to perform his work in strict accordance with these Contract Documents. Notice of such revocation of approval will be given in writing to the Contractor.

The Contractor will promptly, upon request, file with the City a conformed copy of the subcontract. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of these Contract Documents, insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontracts that the City may exercise over the Contractor under provisions of these Contract Documents.

The Contractor shall be required to perform with his own forces at least twenty-five (25) percent of the work, unless written consent to subcontract a greater percentage of the work is first obtained from the City.

ARTICLE 5.02 RESPONSIBILITY

The approval by the City of a subcontractor shall not relieve the Contractor of any of his responsibilities, duties, and liabilities hereunder. The Contractor shall be solely responsible to the City for the acts or defaults or omissions of his subcontractor and of such subcontractor's officers, agents, and employees, each of whom shall for all purposes be deemed to be the agent or employee of the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and the City.

SECTION 6

SECURITY AND GUARANTY

ARTICLE 6.01 CONTRACT SECURITY

The Contractor shall execute and deliver to the City a Performance Bond on the form as provided herein, in an amount at least equal to one hundred (100) percent of the full Contract price, such Bond to be executed by a surety company acceptable to the City. The surety on such Performance Bond shall be a surety company duly authorized to do business in the State of Florida, and the Bond shall be issued or countersigned by a local resident producing agent of such surety company who is a resident of the State of Florida, regularly commissioned and licensed in said State, and satisfactory evidence of the authority of the person or persons executing such Bond shall be submitted with the Bond. The Performance Bond shall serve as security for the faithful performance of this Contract, including maintenance and guaranty provisions, and for the payment of all persons performing labor and

furnishing materials in connection with the Contract. The premiums on the Performance Bond shall be paid by the Contractor.

If, at any time, the City shall become dissatisfied with any surety or sureties then upon the Performance Bond, or if for any other reason such bond shall cease to be adequate security for the City, the Contractor shall, within five days after notice so to do, substitute an acceptable Bond in such form and sum and signed by such other sureties as may be satisfactory to the City. The premiums on such Bond shall be paid by the Contractor. No further partial payments shall be deemed due or shall be made until the new sureties have qualified.

ARTICLE 6.02 CONTRACTORS INSURANCE

Insurance required shall be as indicated on Special Instructions pages beginning with "INS-1"

ARTICLE 6.03 AGAINST CLAIMS AND LIENS

The City may withhold from the Contractor as much as any approved payments to him as may, in the opinion of the City, be necessary to secure (a) just claims of any persons supplying labor or materials to the Contractor or any of his subcontractors for the work then due and unpaid; (b) loss due to defective work not remedied, or (c) liability, damage, or loss due to injury to persons or damages to the work or property of other contractors, subcontractors, or others, caused by the act or neglect of the Contractor or of any of his subcontractors. The City shall have the right, as agent for the Contractor, to apply any such amounts so withheld in such manner as the City may deem proper to satisfy such claims or to secure such protection. Such application of such money shall be deemed payments for the account of the Contractor.

ARTICLE 6.04 MAINTENANCE AND GUARANTY

The Contractor hereby guarantees all the work furnished under this Contract against any defects in workmanship and materials for a period of one year following the date of final acceptance of the work by the City. Under this guarantee, the Contractor hereby agrees to make good, without delay, at his own expense, any failure of any part of the work due to faulty materials or manufacture, construction, or installation, or the failure of any equipment to perform satisfactorily all the work put upon it within the limits of the Contract Documents, and further, shall make good any damage to any part of the work caused by such failure. It is hereby agreed that the Performance Bond shall fully cover all guarantees contained in this Article.

It is also agreed that all warranties, expressed or implied, inure to the benefit of the City and are enforceable by the City.

SECTION 7

CHANGES

ARTICLE 7.01 MINOR CHANGES

The City reserves the right to make such additions, deductions, or changes to this Contract from time to time as it deems necessary and in a manner not materially affecting the substance thereof or materially changing the price to be paid in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed. This Contract shall in no way be invalidated by any such additions, deductions, or changes, and no claim by the Contractor shall be made for any loss of anticipated profits thereby.

Construction conditions may require that minor changes be made in the location and installation of the work and equipment to be furnished and other work to be performed hereunder, and the Contractor when ordered by the Engineer, shall make such adjustments and changes in said locations and work as may be necessary, without additional cost to the City, provided such adjustments and changes do not alter the character, quantity of cost of the work as a whole, and provided further that Plans and Specifications showing such adjustments and changes are furnished to the Contractor by the City within a reasonable time before any work involving such adjustment and changes is begun. The Engineer shall be the sole judge of what constitutes a minor change for which no additional compensation shall be allowed.

ARTICLE 7.02 EXTRA WORK

The City may at any time by a written order and without notice to the sureties require the performance of such extra work as it may find necessary or desirable. An order for extra work shall be valid only if issued in writing and signed by the Mayor and the work so ordered must be performed by the Contractor.

The amount of compensation to be paid to the Contractor for any extra work as so ordered shall be determined as follows:

(a)By such applicable unit prices, if any, as are set forth in the Proposal; or

(b)If no such unit prices are set forth then by a lump sum or other unit prices mutually agreed upon by the City and the Contractor; or

(c)If no such unit prices are set forth in the Proposal and if the parties cannot agree upon a lump sum or other unit prices then by the actual net cost in money to the Contractor of the extra work

performed, which cost shall be determined as follows:

(1) For all labor and foreman in direct charge of the authorized operations, the Contractor shall receive the current local rate of wages to be agreed upon, in writing, before starting such work for each hour that said labor and foremen are actually engaged thereon, to which shall be added an amount equal to 25 percent of the sum thereof which shall be considered and accepted as full compensation for general supervision, FICA taxes, contributions under the Florida Unemployment Compensation Act, insurance, bond, subcontractor's profit and overhead, the furnishing of small tools and miscellaneous equipment used, such as picks, shovels, hand pumps, and similar items.

(2) For all materials used, the Contractor shall receive the actual cost of such materials delivered at the site or previously approved delivery point as established by original receipted bills. No percentage shall be added to this cost.

(3) For special equipment and machinery such as power-driven pumps, concrete mixers, trucks, and tractors, or other equipment, required for the economical performance of the authorized work, the Contractor shall receive payment based on the average local area rental price for each item of equipment and the actual time of its use on the work. No percentage shall be added to this sum.

(4) Records of extra work done under this procedure shall be reviewed at the end of each day by the Contractor or his representative and the Engineer. Duplicate copies of accepted records shall be made and signed by both Contractor or his representative and the Engineer, and one copy retained by each.

Request for payment for approved and duly authorized extra work shall be submitted in the same form as Contract work or in the case of work performed under paragraph (c) (1) above upon a certified statement supported by receipted bills. Such statement shall be submitted for the current Contract payment for the month in which the work was done.

ARTICLE 7.03 DISPUTED WORK

If the Contractor is of the opinion that any work required, necessitated, or ordered violates the terms and provisions of this Contract, he must promptly notify the Engineer, in writing, of his contentions with respect thereto and request a final determination thereof. If the Engineer determines that the work in question is Contract work and not extra work or that the order complained of is proper, he will direct the Contractor to proceed and the Contractor shall promptly comply. In order, however, to reserve his right to claim compensation for such work or damages resulting from such compliance, the Contractor must, within five (5) days after receiving notice of the Engineer's determination and direction, notify the

City in writing that the work is being performed or that the determination and direction is being complied with under protest. Failure of the Contractor to notify shall be deemed as a waiver of claim for extra compensation or damages therefor.

Before final acceptance by the City, all matters of dispute must be adjusted to the mutual satisfaction of the parties thereto. Final determinations and decisions, in case any questions shall arise, shall constitute a condition precedent to the right of the Contractor to receive the money therefor until the matter in question has been adjusted.

ARTICLE 7.04 OMITTED WORK

The City may at any time by a written order and without notice to the sureties require the omission of such Contract work as it may find necessary or desirable.

An order for omission of work shall be valid only if signed by the Mayor and the work so ordered must be omitted by the Contractor. The amount by which the Contract price shall be reduced shall be determined as follows:

(a) By such applicable unit prices, if any, as are set forth in the Contract; or

(b) By the appropriate lump sum price set forth in the Contract; or

(c) By the fair and reasonable estimated cost to the City of such omitted work as determined by the Engineer and approved by the City.

SECTION 8

CONTRACTOR'S EMPLOYEES

ARTICLE 8.01 CHARACTER AND COMPETENCY

The Contractor and his subcontractors shall employ upon all parts of the work herein contracted for only competent, skillful, and trustworthy workers. Should the Engineer at any time give notice, in writing, to the Contractor or his duly authorized representative on the work that any employee in his opinion is incompetent, unfaithful, disorderly, careless, unobservant of instructions, or in any way a detriment to the satisfactory progress of the work, such employee shall immediately be dismissed and not again allowed upon the site.

ARTICLE 8.02 SUPERINTENDENCE

The Contractor shall give his personal supervision to the faithful prosecution of the work and in case of

his absence shall have a competent, experienced, and reliable supervisor or superintendent, acceptable to the Engineer on the site who shall follow without delay all instructions of the Engineer in the prosecution and completion of the work and every part thereof, in full authority to supply workers, material, and equipment immediately. He shall keep on hand at all times copies of the Contract Documents.

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES

The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination regarding race, creed, color, sex or national origin and must not maintain or provide facilities that are segregated on the basis of race, color, creed or national origin.

ARTICLE 8.04 RATES OF WAGES

On federally assisted projects, the rates of wages to be paid under this Contract shall not be less than the rates of wages set forth in Section 12 of this Agreement.

On other projects, no wage rate determination is included. Florida's Prevailing Wage Law (Section 215.19, Florida Statutes) was repealed effective April 25, 1979.

ARTICLE 8.05 PAYROLL REPORTS

The Contractor and each subcontractor shall, if requested to do so, furnish to the Engineer a duly certified copy of his payroll and also any other information required by the Engineer to satisfy him that the provisions of the law as to the hours of employment and rate of wages are being observed.

Payrolls shall be prepared in accordance with instructions furnished by the City and on approved forms. The Contractor shall not carry on his payroll any persons not employed by him. Subcontractor's employees shall be carried only on the payrolls of the employing subcontractor.

SECTION 9

CONTRACTOR'S DEFAULT

ARTICLE 9.01 CITY'S RIGHT AND NOTICE

It is mutually agreed that: (a) if the Contractor fails to begin work when required to do so, or (b) if at any time during the progress of the work it shall appear to the Engineer that the Contractor is not prosecuting the work with reasonable speed, or is delaying the work unreasonably and unnecessarily, or (c) if the force of workmen or quality or quantity of material furnished are not sufficient to insure completion of the work within the specified time and in accordance with the Specifications hereto

attached, or (d) if the Contractor shall fail to make prompt payments for materials or labor or to subcontractors for work performed under the Contract, or (e) if legal proceedings have been instituted by others than the City in such manner as to interfere with the progress of the work and may subject the City to peril of litigation or outside claims of (f) if the Contractor shall be adjudged a bankrupt or make an assignment for the benefit of creditors, or (g) if in any proceeding instituted by or against the Contractor an order shall be made or entered granting an extension of time of payment, composition, adjustment, modification, settlement or satisfaction of his debts or liabilities, or (h) if a receiver or trustee shall be appointed for the Contractor or the Contractor's property, or (i) if the Contract or any part thereof shall be sublet without the consent of the City being first obtained in writing, or (j) if this Contract or any right, monies, or claim thereunder shall be assigned by the Contractor, otherwise than as herein specified, or (k) if the Contractor shall fail in any manner of substance to observe the provisions of this Contract, or (l) if any of the work, machinery, or equipment shall be defective, and shall not be replaced as herein provided, or (m) if the work to be done under this Contract shall be abandoned, then such fact or conditions shall be certified by the Engineer and thereupon the City without prejudice to any other rights or remedies of the City, shall have the right to declare the Contractor in default and so notify the Contractor by a written notice, setting forth the ground or grounds upon which such default is declared and the Contractor must discontinue the work, either as a portion of the work or the whole thereof, as directed.

ARTICLE 9.02 CONTRACTOR'S DUTY UPON DEFAULT

Upon receipt of notice that his Contract is in default, the Contractor shall immediately discontinue all further operations on the work or such part thereof, and shall immediately quit the site or such part thereof, leaving untouched all plant, materials, equipment, tools, and supplies.

ARTICLE 9.03 COMPLETION OF DEFAULTED WORK

The City, after declaring the Contractor in default, may then have the work completed or the defective equipment or machinery replaced or anything else done to complete the work in strict accordance with the Contract Documents by such means and in such manner, by Contract with or without public letting, or otherwise, as it may deem advisable, utilizing for such purpose without additional cost to the City such of the Contractor's plant, materials, equipment, tools, and supplies remaining on the site, and also such subcontractors as it may deem advisable.

The City shall reimburse all parties, including itself, for the expense of such completion, including liquidated damages, if any, and the cost of reletting. The City shall deduct this expense from monies due or to become due to the Contractor under this Contract, or any part thereof, and in case such expense is more than the sum remaining unpaid of the original contract price, the Contractor and his sureties shall pay the amount of such deficiency to the City.

ARTICLE 9.04 PARTIAL DEFAULT

In case the City shall declare the Contractor in default as to a part of the work only, the Contractor shall discontinue such part, shall continue performing the remainder of the work in strict conformity with the terms of the Contract, and shall in no way hinder or interfere with any other contractor or person whom the City may engage to complete the work as to which the Contractor was declared in default.

SECTION 10

PAYMENTS

ARTICLE 10.01 PRICES

For the Contractor's complete performance of the work, the City will pay and the Contractor agrees to accept, subject to the terms and conditions hereof, the lump sum prices or unit prices in the Contractor's Proposal and the award made therein, plus the amount required to be paid for any extra work ordered under Article 7.02 hereof, less credit for any work omitted pursuant to Article 7.04 hereof. Under unit price items, the number of units actually required to complete the work under the Contract may be more than stated in the Proposal. The Contractor agrees that no claim will be made for any damages or for loss of profits because of a difference between the quantities of the various classes of work assumed and stated in the Proposal Form as a basis for comparing Proposals and the quantities of work actually performed.

The sum as awarded for any lump sum Contract or lump sum Contract Item shall represent payment in full for all of the various classes of work, including materials, equipment, and labor necessary or required to complete, in conformity with the Contract Document, the entire work shown, indicated or specified under the lump sum Contract or lump sum Contract Item.

The amount as awarded as a unit price for any unit price Contact Item shall represent payment in full for all the materials, equipment, and labor necessary to complete, in conformity with the Contract Documents, each unit of work shown, specified, or required under the said unit price Contract Item.

No payment other than the amount as awarded will be made for any class of work included in a lump sum Contract Item or a unit price Contract Item, unless specific provision is made therefor in the Contract Documents.

ARTICLE 10.02 SUBMISSION OF BID BREAKDOWN

Within fifteen (15) days after the execution of this Contract, the Contractor must submit to the

Engineer in duplicate an acceptable breakdown of the lump sums and unit prices bid for items of the Contract, showing the various operations to be performed under the Contract, as described in the progress schedule required under Article 4.02 hereof, and the value of each of such operations, the total of such items to equal the total price bid. The Contractor shall also submit such other information relating to the bid prices as may be required and shall revise the bid breakdown as directed. Thereafter, the breakdown may be used for checking the Contractor's applications for partial payments hereunder but shall not be binding upon the City or the Engineer for any purpose whatsoever.

ARTICLE 10.03 REPORTS, RECORDS AND DATA

The Contractor shall furnish to the Engineer such schedules of quantities and costs, progress schedules, reports, invoices, delivery tickets, estimates, records, and other data as the Engineer may request concerning work performed or to be performed and the materials furnished under the Contract.

ARTICLE 10.04 PAYMENTS BY CONTRACTOR

The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which such services are rendered, (b) for all materials, tools, and equipment delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each subcontractor's interest therein; and proof of such payments or releases therefor shall be submitted to the Engineer upon request.

ARTICLE 10.05 PARTIAL PAYMENTS

On or about the first of each month, the Contractor shall make and certify an estimate, on forms prescribed by the City, of the amount and fair value of the work done, and may apply for partial payment therefor. The Contractor shall revise the estimate as the Engineer may direct. When satisfactory progress has been made, and shows that the value of the work completed since the last payment exceeds one percent (1%) of the total Contract price in amount, the Engineer will issue a certificate that such work has been completed and the value thereof. The City will then issue a voucher to the Contractor in accordance with the following schedule:

FOR CONTRACT AMOUNTS UNDER $250,000

(A)In the amount of ninety percent (90%) of the value of the work completed as certified until construction is one hundred percent (100%) complete (operational or beneficial occupancy), the withheld amount may be reduced below ten percent (10%), at the Engineer's option, to only that

amount necessary to assure completion.

FOR CONTRACT AMOUNTS OVER $250,000

(A)In the amount of ninety percent (90%) of the value of the work completed as certified until construction is fifty percent (50%) complete.

(B)When the dollar value, as determined by the Engineer, of satisfactorily completed work in place is greater than fifty percent (50%) of the original contract price, vouchers for partial payment will be issued by the City to the Contractor in the amount of one hundred percent (100%) of the value of the work, above 50%, completed as certified for that payment period.

(C)If the Contractor has performed satisfactorily and the work is substantially complete (operational or beneficial occupancy) the withheld amount may be reduced, at the Engineer's option, to only that amount necessary to assure completion.

In addition to the Conditions set forth in (A), (B), and (C) above, payments will always be less any sums that may be retained or deducted by the City under the terms of any of the contract documents and less any sums that may be retained to cover monetary guarantees for equipment, materials or progress performance.

Payment on estimates made on or about the first of the month may be expected on or about the 20th of the month.

Unless specified otherwise in the Contract Items, the delivered cost of equipment and nonperishable materials suitably stored at the site of the work and tested for adequacy may be included in the Contractor's application for partial payment provided, however, that the Contractor shall furnish evidence satisfactory to the City that the Contractor is the unconditional owner and in possession of such materials or equipment. The amount to be paid will be 90 percent of the invoice cost to the Contractor which cost shall be supported by receipted bills within 30 days of the date of payment by the City to the Contractor. Such payment shall not relieve the Contractor from full responsibility for completion of the work and for protection of such materials and equipment until incorporated in the work in a permanent manner as required by the Contract Documents.

Before any payment will be made under this Contract, the Contractor and every subcontractor, if required, shall deliver to the Engineer a written, verified statement, in satisfactory form, showing in detail all amounts then due and unpaid by such Contractor or subcontractor to all laborers, workmen, and mechanics, employed by him under the Contract for the performance of the work at the site thereof, for daily or weekly wages, or to other persons for materials, equipment, or supplies delivered at the site of the work during the period covered by the payment under consideration.

ARTICLE 10.06 FINAL PAYMENT

Under determination of satisfactory completion of the work under this Contract as provided in Article 4.07 hereof, the Engineer will prepare the final estimate showing the value of the completed work. This estimate will be prepared within 30 days after the date of completion or as soon thereafter as the necessary measurements and computations can be made. All prior certificates and estimates, being approximate only, are subject to correction in the final estimate and payment.

When the final estimate has been prepared and certified by Engineer, he will submit to the Mayor and City Council the final certificate stating that the work has been completed and the amount based on the final estimate remaining due to the Contractor. The City will then accept the work as fully completed and will, not later than 30 days after the final acceptance, as defined in Article 1.02, of the work done under this Contract, pay the Contractor the entire amount so found due thereunder after deduction of all previous payments and all percentages and amounts to be kept and retained under provisions of this Contract; provided, however, and it is understood and agreed that, as a precedent to receiving final payment, the Contractor shall submit to the City a sworn affidavit that all bills for labor, service, materials, and subcontractors have been paid and that there are no suits pending in connection with this work. The City, at its option, may permit the Contractor to execute a separate surety bond in a form satisfactory to the City. The surety bond shall be in the full amount of the suit or suits.

Neither the final payment nor any part of the retained percentage shall be paid until the Contractor, if required, shall furnish the City with a complete release from any should remain unsatisfied after all payments are made, the Contractor shall refund to the City all monies which the City may be compelled to pay in discharging such claim, including incidental costs and attorney's fees.

ARTICLE 10.07 ACCEPTANCE OF FINAL PAYMENT

The acceptance by the Contractor, or by anyone claiming by or through him, of the final payment shall operate as and shall be a release to the City and every officer and agent thereof from any and all claims and liability to the Contractor for anything done or furnished in connection with the work or project and for any act or neglect of the Contractor or of any others relating to or affecting the work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or the Performance Bond.

SECTION 11

MISCELLANEOUS PROVISIONS

ARTICLE 11.01 CONTRACTOR'S WARRANTIES

In consideration of, and to induce the award of this contract to him, the Contractor represents and warrants:

(a)That he is not in arrears to the City upon debt or contract, and he is not a defaulter, as surety, contractor, or otherwise.

(b)That he is financially solvent and sufficiently experienced and competent to perform the work.

(c)That the work can be performed as called for by the Contract Documents.

(d)That the facts stated in his proposal and the information given by him are true and correct in all respects.

(e)That he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be furnished for the completion of this Contract, and that his information was secured by personal investigation and research.

ARTICLE 11.02 PATENTED DEVICES, MATERIAL AND PROCESSES

It is mutually understood and agreed that Contract prices include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work. Whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify and save harmless the City, its officers, agents and employees from any and all claims for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract, and shall indemnify the said City, its officers, agents, and employees for any costs, expenses, and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

ARTICLE 11.03 SUITS AT LAW

In case any action at law or suit in equity may or shall be brought against the City or any of its officers, agents, or employees for or on account of the failure, omission, or neglect of the Contractor or his subcontractors, employees, or agents, to do or perform any of the covenants, acts, matters, or things by this Contract undertaken to be done or performed by the Contractor of his subcontractors, employees, or agents, or from any injuries done to property or persons and caused by the negligence or

alleged negligence of the Contractor of his subcontractors, employees, or agents, or in any other manner arising out of the performance of this Contract, then the Contractor shall immediately assume and take charge of the defense of such actions or suits in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor, and the Contractor shall also indemnity and save harmless the City, its officers, agents, and employees from any and all loss, cost or damage whatever arising out of such actions or suits, in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor.

The Contractor shall and does hereby assume all liability for and agrees to indemnify the City or its Engineer against any or all loss, costs, damages, and liability for any or by reason of any lien, claims or demands, either for materials purchased or for work performed by laborers, mechanics, and others and from any damages, costs, actions, or causes of action and judgement arising from injuries sustained by mechanics, laborers, or other persons by reason of accidents or otherwise, whether caused by the carelessness or inefficiency or neglect of said Contractor, his subcontractors, agents, employees, workmen or otherwise.

ARTICLE 11.04 CLAIMS FOR DAMAGES

If the Contractor shall claim compensation for any damage sustained, other than for extra or disputed work covered by Article 7.02 and 7.03 hereof, by reason of any act or omission of the City, its agents, or any persons, he shall, within five days after sustaining such damage, make and deliver to the Engineer a written statement of the nature of the damage sustained and of the basis of the claim against the City. On or before the 15th of the month succeeding that in which any damage shall have been sustained, the Contractor shall make and deliver to the Engineer an itemized statement of the details and amounts of such damage, duly verified by the Contractor. Unless such statements shall be made delivered within the times aforesaid, it is stipulated that and all claims for such compensation shall be forfeited and invalidated, and the Contractor shall not be entitled to payment on account of such claims.

ARTICLE 11.05 NO CLAIMS AGAINST INDIVIDUALS

No claim whatsoever shall be made by the Contractor against any officer, agent, employee of the City for, or on account of, anything done or omitted to be done in connection with this Contract.

ARTICLE 11.06 LIABILITY UNAFFECTED

Nothing herein contained shall in any manner create any liability against the City on behalf of any claim for labor, services, or materials, or of subcontractors, and nothing herein contained shall affect the liability of the Contractor or his sureties to the City or to any workmen or materialsmen upon bond

given in connection with this Contract.

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

Whenever there appears in this Agreement, or in the other Contact Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

ARTICLE 11.08 UNLAWFUL PROVISIONS DEEMED STRICKEN

If this contract contains any unlawful provisions not an essential part of the Contract and which shall not appear to have a controlling or material inducement to the making thereof, such provisions shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the Contract without affecting the binding force of the remainder.

ARTICLE 11.09 LEGAL PROVISIONS DEEMED INCLUDED

Each and every provision of any law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein and if, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon application of either party the Contract shall forthwith be physically amended to make such insertion.

ARTICLE 11.10 DEATH OR INCOMPETENCY OF CONTRACTOR

In the event of death or legal incompetency of a Contractor who shall be an individual or surviving member of a contracting firm, such death or adjudication of incompetency shall not terminate the Contract, but shall act as default hereunder to the effect provided in Article 9.01 hereof and the estate of the Contractor and his surety shall remain liable hereunder to the same extent as though the Contractor had lived. Notice of default, as provided in Article 9.01 hereof, shall not be required to be given in the event of such death or adjudication of incompetency.

ARTICLE 11.11 NUMBER AND GENDER OF WORDS

Whenever the context so admits or requires, all references herein in one number shall be deemed extended to and including the other number, whether singular or plural, and the use of any gender shall be applicable to all genders.

ARTICLE 11.12 ACCESS TO RECORDS

Representatives of Federal Agencies, if applicable, and the State of Florida shall have access to the work whenever it is in preparation of progress. On federally assisted projects the Federal Agency, the Comptroller General of the United States, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcription thereof.

SECTION 12

LABOR STANDARDS

ARTICLE 12.01 LABOR STANDARDS

The Contractor shall comply with all applicable the regulations set forth in "Labor Standards Provisions for Federally Assisted Construction Contracts", which may be attached, and any applicable Florida Statutes.

ARTICLE 12.02 NOTICE TO LABOR UNIONS

If required, the Contractor shall provide Labor Unions and other organizations of workers, and shall post, in a conspicuous place available to employees or applicants for employment, a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers" attached to and made a part of this Agreement.

ARTICLE 12.03 SAFETY AND HEALTH REGULATIONS

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). Nothing in these Acts shall be construed to supersede or in any manner affect any worker's compensation law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment.

ARTICLE 12.04 Not Applicable

ARTICLE 12.05 PREVAILING RATES OF WAGES

Florida's prevailing wage law was repealed effective April 25, 1979.

For Federally assisted projects, appropriate prevailing wage rate determinations are indicated on pages beginning with WR-1.

PUBLIC CONSTRUCTION BOND form

Bond No. (enter bond number)_____

Name of Contractor:_____

Principal Business Address of Contractor:_____

Telephone Number of Contractor:_____

Name of Surety (if more than one list each):_____

Principal Business Address of Surety:_____

Telephone Number of Surety:_____

Owner is The City of Tampa, Florida

Principal Business Address of Owner: 306 E Jackson St, Tampa, FL 33602

Contract Administration Department (280A4N)

Telephone Number of Owner: 813/274-8456

Contract Number Assigned by City to contract which is the subject of this bond:_____

Legal Description or Address of Property Improved or Contract Number is:_____

General Description of Work and Services:_____

KNOW ALL MEN BY THESE PRESENTS That we, _____ (Name of Contractor)

as Principal, hereinafter called CONTRACTOR, of the State of _____, and

_____(Name of Surety)

a corporation organized and existing under and by virtue of the laws of the State of _____, and regularly authorized to do business in the State of Florida, as SURETY, are held and firmly bound unto the City of Tampa, a municipal corporation organized and existing under the laws of the State of Florida, hereinafter called Owner, in the penal sum of _____Dollars and _____Cents ($_____), lawful money of the United States of America, for the payment whereof well and truly to be made, we bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the contract dated _____, _____, 20___, between Principal and Owner for construction of _____, the contract being made a part of this bond by reference, in the time and in the manner prescribed in the contract; and

2. Promptly makes payments to all claimants, as defined in Section 255.05(1) (Section 713.01), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the work provided for in the contract; and

3. Pays Owner all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Principal under the contract; and

4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.

5. Contractor and Surety acknowledge that the Work for which this bond has been issued may be one of several such contract documents for a group of projects. This bond does not secure covenants to

pay for or to perform design services survey or program management services. The Owner/Obligee is expected to reasonably account for damages that are caused to Owner with respect to Principal's (Contractor's) default in performance of the scope of the Work incorporated by reference into the bond, and notwithstanding any contractual or common law remedy permitted to Owner as against Contractor, the obligation of Surety for any damages under this bond shall be determined by the cost of completion of the Work less the contract balance unpaid upon default of Contractor for the Work plus liquidated damages at the rate of $500.00 per day for delays by the Contractor and/or Surety in reaching substantial completion.

6. The notice requirements for claimants and conditions for entitlement to payment set forth in Section 255.05, Fla. Stat. and the limitations period to actions upon Section 255.05, Fla. Stat. bonds apply to claimants seeking payment from surety under this bond. Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05, Florida Statutes.

7. The Surety, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the contract documents or other Work to be performed hereunder, or the specifications referred to therein shall in any way affect its obligations under this bond, and it does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to Work or to the specifications.

8. The above SURETY states that it has read all of the Contract Documents made by the CONTRACTOR with the CITY, hereto attached, and the terms and conditions of the contract and work, and is familiar therewith and in particular those portions of the Agreement concerning the guaranty of such CONTRACTOR for a period of one year following the date of the final acceptance of the completed work under the Contract by the CITY, all of which this BOND includes.

DATED ON _____, 20___

_____	_____
(Name of Principal)	(Name of Surety)
_____	_____
(Principal Business Address)	(Surety Address)
By _____	By _____
	(As Attorney in Fact)*
Title _____	_____

Telephone Number of Surety _____

Telephone Number of Principal

Approved as to legal sufficiency: By Justin R. Vaske e/s

Justin R. Vaske, Senior Assistant City Attorney

City of Tampa, Florida (Name of Local Agency)

_____(Address of Resident Agent)

By _____

Title _____

_____

Telephone Number of Local Agency

*(As Attorney in Fact) attach Power of Attorney and Current Certificate with Original Signature

SPECIFICATIONS

GENERAL PROVISIONS

SECTION 1

SCOPE AND INTENT

G-1.01 DESCRIPTION

The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

G-1.02 WORK INCLUDED

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Provisions, for which there are no specific Contract Items, shall be considered as part of the overhead cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefor.

The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his plant and equipment, prior approval of the Engineer notwithstanding.

G-1.03 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, and all other appurtenances and facilities pertaining thereto whether owned or controlled by the City, other governmental bodies or privately

owned by individuals, firms, or corporations, and used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work.

The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.

The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the City or other governmental body which are shown on the Plans to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefor.

Where public utility installations or structures owned or controlled by the City or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction or such work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided for in Article 7.02 of the Agreement.

The Contractor shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.

All City and other governmental utility departments and other owners of public utilities, which may be affected by the work, will be informed in writing by the Engineer within two weeks after the execution of the Contract or Contracts covering the work. Such notice will set out, in general, and direct attention to, the responsibilities of the City and other governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the work and will be accompanied by one set of Plans and Specifications covering the work under such Contract or Contracts.

In addition to the general notice given by the Engineer, the Contractor shall give written notice to all City and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight (48) hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Underground Utility Notification Center for Excavators (Call Candy)".

The maintenance, repair, removal, relocation, or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

SECTION 2

PLANS AND SPECIFICATIONS

G-2.01 PLANS

The Plans referred to in the Contract Documents bear the general project name and number as shown in the Notice To Bidders.

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.

G-2.02 COPIES FURNISHED TO CONTRACTOR

After the Contract has been executed, the Contractor will be furnished with five sets of paper prints, the same size as the original drawings, of each sheet of the Plans and five copies of the Specifications. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

The Contractor shall furnish each of the subcontractors, manufacturers, and material suppliers such copies of the Contract Documents as may be required for his work.

G-2.03 SUPPLEMENTARY DRAWINGS

When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and five paper prints thereof will be given to the Contractor.

The Supplementary Drawings shall be binding upon the Contractor with the same force as the Plans. Where such Supplementary Drawings require either less or more than the estimated quantities of work, credit to the City or compensation therefor to the Contractor shall be subject to the terms of the Agreement.

G-2.04 CONTRACTOR TO CHECK PLANS AND DATA

The Contractor shall verify all dimensions, quantities, and details shown on the Plans, Supplementary Drawings, Schedules, Specifications, or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions as full instructions will be furnished by the Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

G-2.05 SPECIFICATIONS

The specifications consist of four parts, the General Provisions, the Technical Specifications, the Special Provisions and the Contract Items. The General Provisions and Technical Specifications contain general requirements which govern the work. The Special Provisions and the Contract Items modify and supplement these by detailed requirements for the work and shall always govern, whenever there appears to be conflict.

G-2.06 INTENT

All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete

and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

SECTION 3

WORKING DRAWINGS

G-3.01 SCOPE

The Contractor shall promptly prepare and submit layout, detail and shop drawings to insure proper construction, assembly, and installation of the work using those materials and methods as hereafter specified under the Technical Specifications, Special Provisions and Contract Items.

These drawings shall accurately and distinctly present the following:

a. All working and erection dimensions.

b. Arrangements and sectional views.

c. Necessary details, including complete information for making connections between work under this Contract and work under other Contracts.

d. Kinds of materials and finishes.

e. Parts listed and description thereof.

Drawings for mechanical equipment shall present, where applicable, such data as dimensions, weight and performance characteristics. These data shall show conformance with the performance characteristics and other criteria incorporated in the Plans and Specifications.

Each drawing shall be dated and shall contain the name of the project, Division number and description, the technical specifications section number, names of equipment or materials and the location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material. The Engineer will return unchecked any submittal which does not contain complete data on the work and full information on related matters.

Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.

The Contractor shall review all working drawing submittals before transmitting them to the Engineer to determine that they comply with requirements of the Specifications. Drawings which are incomplete or are not in compliance with the Contract Documents shall not be submitted for processing by the Engineer. The Contractor shall place his stamp of approval on all working drawings submitted to the Engineer to indicate compliance with the above.

G-3.02 APPROVAL

If the working drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of submittal; otherwise approval of such submittals shall not constitute approval of the departure. Approval of the drawings shall constitute approval of the subject matter thereof only and not of any structure, material, equipment, or apparatus shown or indicated.

The approval of drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract and not indicated on the drawings. No work called for by working drawings shall be done until such drawings have been approved by the Engineer.

The procedure in seeking approval of the working drawings shall be as follows:

1.The Contractor shall submit four complete sets of drawings and other descriptive data together with one copy of a letter of transmittal to the Engineer for approval. The letter of transmittal shall contain the name of the project, contract number, technical specifications section number, the name of the Contractor, a list of drawings with numbers and titles, and any other pertinent information.

2.Drawings or descriptive data will be stamped "Approved", "Approved Subject to Corrections Marked", or "Examined and Returned for Correction" and one copy with a letter of transmittal will be returned to the Contractor.

3.If a drawing or other data is stamped "Approved", the Contractor shall insert the date of approval on five additional copies of the document and transmit the five copies to the Engineer together with one copy of a letter of transmittal containing substantially the same information as described in Instruction 1. above.

4.If a drawing or other data is stamped "Approved Subject to Corrections Marked", the Contractor shall make the corrections indicated and proceed as in Instruction 3., above.

5.If a drawing or data is stamped "Examined and Returned for Correction", the Contractor shall make the necessary corrections and resubmit the documents as set forth in Instruction 1., above. The letter of transmittal shall indicate that this is a resubmittal.

The Contractor shall revise and resubmit the working drawings as required by the Engineer, until approval thereof is obtained.

SECTION 4

MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS

All materials, appliances, and types or methods of construction shall be in accordance with the Specifications and shall, in no event, be less than that necessary to conform to the requirements of any applicable laws, ordinances, and codes.

All materials and equipment shall be new, unused, and correctly designed. They shall be of standard first grade quality, produced by expert personnel, and intended for the use for which they are offered. Materials or equipment which, in the opinion of the Engineer, are inferior or of a lower grade than indicated, specified, or required will not be accepted.

The quality of Workmanship and Materials entering into the work under this Contract shall conform to the requirements of the pertinent sections, clauses, paragraphs, and sentences, both directly and indirectly applicable thereto, of that part of the Technical Specifications, whether or not direct reference to such occurs in the Contract Items.

Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA and other generally accepted standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, and the like, shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

Equipment shall be of the approximate dimensions as indicated on the Plans or as specified, shall fit the spaces shown on the Plans with adequate clearances, and shall be capable of being handled through

openings provided in the structure for this purpose. The equipment shall be of such design that piping and electrical connections, ductwork, and auxiliary equipment can be assembled and installed without causing major revisions to the location or arrangement of any of the facilities.

Machinery parts shall conform exactly to the dimensions shown on the working drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. All grease lubricating fittings on equipment shall be of a uniform type. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI and applicable state and local codes.

G-4.02 MANUFACTURER

The names of proposed manufacturers, suppliers, material, and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Engineer for approval, as early as possible, to afford proper investigation and checking. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.

G-4.03 REFERENCE TO STANDARDS

Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for proposals, even though reference has been made to an earlier standard, and such standards are made a part hereof to the extent which is indicated or intended.

Reference to a technical society, organization or body may be made in the Specifications by abbreviations, in accordance with the following list:

AASHTO for American Association of State Highway and Transportation Officials (formerly AASHO)

ACI for American Concrete Institute

AGMA for American Gear Manufacturer's Association

AFBMA for Anti-Friction Bearing Manufacturer's Association

AISC for American Institute of Steel Construction

AISI for American Iron and Steel Institute

ANSI for American National Standards Institute

ASCE for American Society of Civil Engineers

ASTM for American Society for Testing and Materials

ASME for American Society of Mechanical Engineers

AWS for American Welding Society

AWWA for American Water Works Association

AWPA for American Wood Preservers Association

CEMA for Conveyor Equipment Manufacturers Association

CIPRA for Cast Iron Pipe Research Association

IEEE for Institute of Electrical and Electronic Engineers

IPCEA for Insulated Power Cable Engineers Association

NEC for National Electrical Code

NEMA for National Electrical Manufacturers Association

SAE for Society of Automotive Engineers

SHBI for Steel Heating Boiler Institute

Fed.Spec. for Federal Specifications

Navy Spec. for Navy Department Specifications

U.L.,Inc. for Underwriters' Laboratories, Inc.

When no reference is made to a code, standard or specification, the Standard Specifications of the ANSI, the ASME, the ASTM, the IEEE, or the NEMA shall govern.

G-4.04 SAMPLES

The Contractor shall, when required, submit to the Engineer for approval typical samples of materials and equipment. The samples shall be properly identified by tags and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work, so that rejections thereof will not cause delay. A letter of transmittal, in duplicate, from the Contractor requesting approval must accompany all such samples.

G-4.05 EQUIVALENT QUALITY

Whenever, in the Contract Documents, an article, material, apparatus, equipment, or process is called for by trade name or by the name of a patentee, manufacturer, or dealer or by reference to catalogs of a manufacturer or dealer, it shall be understood as intending to mean and specify the article, material, apparatus, equipment or process designated, or any equal thereto in quality, finish, design, efficiency, and durability and equally serviceable for the purposes for which it is intended.

Whenever material or equipment is submitted for approval as being equal to that specified, the decision as to whether or not such material or equipment is equal to that specified shall be made by the Engineer.

Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the designated material or equipment.

Neither the approval by the Engineer of alternate material or equipment as being equivalent to that specified nor the furnishing of the material or equipment specified, shall in any way relieve the Contractor of responsibility for failure of the material or equipment, due to faulty design, material, or workmanship, to perform the functions required of them by the Specifications.

G-4.06 DELIVERY

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted

progress of the work so as to complete thw work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid a delay in, or impediment of, the progress of the work of any related Contractor.

G-4.07 CARE AND PROTECTION

The Contractor shall be solely responsible for properly storing and protecting all materials, equipment, and work furnished under the Contract from the time such materials and equipment are delivered at the site of the work until final acceptance thereof. He shall, at all times, take necessary precautions to prevent injury or damage by water, freezing, or by inclemencies of the weather to such materials, equipment and work. All injury or damage to materials, equipment, or work resulting from any cause whatsoever shall be made good by the Contractor.

The Engineer shall, in all cases, determine the portion of the site to be used by the Contractor for storage, plant or for other purposes. If, however, it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the work or interference with the work to be done by any other Contractor, the Contractor shall remove and restack such materials at his own expense.

G-4.08 TOOLS AND ACCESSORIES

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

G-4.09 INSTALLATION OF EQUIPMENT

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the Engineer during installation. All

equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the Engineer and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall, at his own expense, furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations. Grout shall completely fill the space between the equipment base and the foundation.

G-4.10 OPERATING INSTRUCTIONS

The Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation and care of all equipment installed hereunder, except for equipment that may be furnished by the City.

The Contractor shall also furnish and deliver to the Engineer three complete sets for permanent files, identified in accordance with Subsection G-3.01 hereof, of instructions, technical bulletins and any other printed matter, such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair, of the equipment installed and the ordering of spare parts, except for equipment that may be furnished by the City.

In addition to the above three copies, the Contractor shall furnish any additional copies that may be required for use during construction and start-up operations.

G-4.11 SERVICE OF MANUFACTURER'S ENGINEER

The Contract prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the City, such engineer or superintendent shall make all adjustments and tests required by the Engineer to provide that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the City in the proper operation and maintenance of such equipment.

SECTION 5

INSPECTION AND TESTING

G-5.01 GENERAL

The Contractor's attention is hereby directed to Article 3.03 of the Agreement.

Inspection and testing of materials will be performed by the City unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material and equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the City.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the City formally takes over the operation thereof.

G-5.02 COSTS

All inspection and testing of materials furnished under this Contract will be performed by the City or duly authorized inspection engineers or inspection bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the contract price.

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the City for compliance. The Contractor shall reimburse the City for the expenditures incurred in making such tests on materials and equipment which are rejected for noncompliance.

G-5.03 INSPECTIONS OF MATERIALS

The Contractor shall give notice, in writing to the Engineer, sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice the Engineer will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

G-5.04 CERTIFICATE OF MANUFACTURE

When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

G-5.05 SHOP TESTS OF OPERATING EQUIPMENT

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.

Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.

The cost of the shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

G-5.06 PRELIMINARY FIELD TESTS

As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract

Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments, and replacements required.

G-5.07 FINAL FIELD TESTS

Upon completion of the work and prior to final payment, all equipment and appliances installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment, and instruments necessary for all acceptance tests, at no additional cost to the City.

G-5.08 FAILURE OF TESTS

Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make those corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees or specified requirements, the City, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the City rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the City may, after the expiration of a period of thirty calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under this Contract.

The City agrees to obtain other equipment within a reasonable time and the Contractor agrees that the City may use the equipment furnished by him without rental or other charges until the new equipment is obtained.

Materials or work in place that fails to pass acceptability tests shall be retested at the direction of the construction engineer all such retests shall be at the Contractor's expense. The rates charged shall be in accordance with the Department of Public Works current annual inspection contract which is available for inspection at the offices of the Department of Public Works.

G-5.09 FINAL INSPECTION

The procedures for final inspection shall be in accordance with the provisions of Article 4.07 of the Agreement. During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all the requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily cosntructed in accordance with the requirements of the Contract Documents.

SECTION 6

TEMPORARY STRUCTURES

G-6.01 GENERAL

All false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the work and which are not herein described or specified in detail, must be furnished, maintained and removed by the Contractor, and he shall be responsible for the safety and efficiency of such works and for any damages that may result from their failure or from their improper construction, maintenance, or operation.

G-6.02 PUBLIC ACCESS

At all points in the work where public access to any building, house, place of business, public road, or sidewalk would be obstructed by any action of the Contractor in executing the work required by this Contract, the Contractor shall provide such temporary structure, bridges or roadway as may be necessary to maintain public access at all times. At least one lane for vehicular traffic shall be maintained in streets in which the Contractor is working. Street closure permits are required from the Department of Public Works.

The Contractor shall provide suitable temporary bridges, as directed by the Engineer, at street intersections when necessary for the maintenance of vehicular and pedestrian traffic.

Prior to temporarily cutting of access to driveways and garages, the Contractor shall give twelve (12) hours notice to affected property owners. Interruptions to use of private driveways shall be kept to a minimum.

G-6.03 CONTRACTOR'S FIELD OFFICE

The Contractor shall erect, furnish and maintain a field office with a telephone at the site during the entire period of construction. He or an authorized agent shall be present at this office at all times

while his work is in progress. Readily accessible copies of both the Contract Documents and the latest approved working drawings shall be kept at this field office.

G-6.04 TEMPORARY FENCE

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the Engineer, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

G-6.05 RESPONSIBILITY FOR TEMPORARY STRUCTURES

In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance, or operation and will indemnify and save harmless the City from all claims, suits or actions and damages or costs of every description arising by reason of failure to comply with the above provisions.

SECTION 7

TEMPORARY SERVICES

G-7.01 WATER

The Contractor shall provide the necessary water supply at his own expense. He shall, if necessary, provide and lay necessary waterlines from existing mains to the place of using, shall secure all necessary permits and pay for all taps to water mains or hydrants and for all water used at the established rates.

G-7.02 LIGHT AND POWER

The Contractor shall provide, at his own expense, temporary lighting and power facilities required for the proper prosecution and inspection of the work. If, in the opinion of the Engineer, these facilities are inadequate, the Contractor will not be permitted to proceed with any portion of the work affected thereby.

G-7.03 SANITARY REGULATIONS

The Contractor shall prohibit and prevent the committing of nuisances on the site of the work or on adjoining property and shall discharge any employee who violates this rule.

Ample washrooms and toilet facilities and a drinking water supply shall be furnished and maintained in strict conformity with the law by the Contractor for use by his employees.

G-7.04 ACCIDENT PREVENTION

Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building and construction codes shall be observed. The Contractor shall comply with the U. S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596), and under Section 107 of the Contract Work. Hours and Safety Standards Act (PL 91-54), except where state and local safety standards exceed the federal requirements and except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act.

G-7.05 FIRST AID

The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when men are employed on the work.

G-7.06 HEATING

The Contractor shall provide temporary heat, at his own expense, whenever required on account of work being carried on during cold weather and to prevent freezing of water pipes and other damage to the work.

SECTION 8

LINES AND GRADES

G-8.01 GENERAL

All work done under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

The Engineer will establish bench marks and base line controlling points. Reference remarks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no

inconvenience in the use of the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

G-8.02 SURVEYS

The Contractor shall furnish and maintain, at his own expense, stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the Engineer for setting reference marks. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review of the Engineer.

The Contractor shall keep the Engineer informed a reasonable time in advance as to his need for line and grade reference marks, in order that they may be furnished and all necessary measurements made for record and payment with the minimum of inconvenience to the Engineer or of delay to the Contractor.

It is the intention not to delay the work for the establishment of reference marks but, when necessary, working operations shall be suspended for such reasonable time as the Engineer may require for this purpose.

G-8.03 SAFEGUARDING MARKS

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

G-8.04 DATUM PLANE

All elevations indicated or specified refer to the Mean Sea Level Datum of the U.S.C. & G.S. (N.O.S.) which is 0.80 feet above the Mean Low Water Datum of the U. S. Army Corps of Engineers.

SECTION 9

ADJACENT STRUCTURES AND LANDSCAPING

G-9.01 RESPONSIBILITY

The responsibility for removal, replacement, relocation, repair, rebuilding or protection of all public utility installations, including poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, sewers, traffic control and fire alarm signal circuit installations and other appurtenances and facilities shall be in accordance with G-1.02 and G-1.03.

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation, and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payment will be made therefor. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the Engineer, removal or relocation and reconstruction is necessary to avoid interference with the work, payment therefor will be made as provided for extra work in Article 7.02 of the Agreement.

G-9.02 PROTECTION OF TREES

All trees and shrubs shall be adequately protected by the Contractor with boxes or otherwise and, within the City of Tampa, in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season, and at the sole expense of the Contractor.

Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.

The City may order the Contractor, for the convenience of the City, to remove trees along the line of trench excavation. If so ordered, the City will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

G-9.03 LAWN AREAS

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be

removed, it shall be carefully removed and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in the Technical Specifications section.

G-9.04 RESTORATION OF FENCES

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or Items, or if no specific Item is provided therefor, as part of the overhead cost of the work, and no additional payment will be made therefor.

SECTION 10

PROTECTION OF WORK AND PUBLIC

G-10.01 TRAFFIC REGULATIONS

The Contractor shall arrange his work to comply with Article G-6.02. The work shall be done with the least possible inconvenience to the public and to that end the work may be confined by the Engineer to one block at a time.

G-10.02 BARRIERS AND LIGHTS

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers, and lights, as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public. Such barriers and signs shall be constructed to State of Florida Department of Transportation standards and placed as recommended by the Traffic Division of the City's Department of Public Works.

No open fires will be permitted.

G-10.03 SMOKE PREVENTIONS

The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production and emission of smoke will be required.

G-10.04 NOISE

The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline motors or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

Except in the event of an emergency, no work shall be done between the hours of 7:00 p.m. and 7:00 a.m., or on Sundays. If the proper and efficient prosecution of the work requires operations during the night, the written permission of the Engineer shall be obtained before starting such items of the work.

G-10.05 ACCESS TO PUBLIC SERVICES

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

G-10.06 DUST PREVENTION

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the streets sprinkled with water at all times.

G-10.07 PRIVATE PROPERTY

The Contractor shall so conduct the work that no equipment, material, or debris will be placed or allowed to fall upon private property in the vicinity of the work unless he shall have obtained the owner's written consent thereto and shall have shown this consent to the Engineer.

SECTION 11

SLEEVES AND INSERTS

G-11.01 COORDINATION

When the Contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors, and other like work in floors, roofs, or walls of buildings and structures, they shall be promptly installed in conformity with the construction program. The Contractor who erects the floors, roofs, and walls shall facilitate such work by fully cooperating with the Contractors responsible for installing such appurtenances. The Contractor responsible for installing such appurtenances shall arrange the work in strict conformity with the construction schedule and avoid interference with the work of other contractors.

G-11.02 OPENINGS TO BE PROVIDED

In the event timely delivery of sleeves and other materials cannot be made and to avoid delay, the affected Contractor may arrange to have boxes or other forms set at the locations where the appurtenances are to pass through or into the floors, roofs, walls, or other work. Upon the subsequent installation of these appurtenances, the Contractor erecting the structure shall fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in shall be borne by the Contractor or Contractors required to furnish the sleeves and inserts. Formed openings and later installation of sleeves will not be permitted at locations subject to hydrostatic pressure.

SECTION 12

CUTTING AND PATCHING

G-12.01 GENERAL

The Contractor shall do all cutting, fitting, or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Plans and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.

SECTION 13

CLEANING

G-13.01 DURING CONSTRUCTION

During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris, and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefor develops.

G-13.02 FINAL CLEANING

At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished, and new appearing condition.

SECTION 14

MISCELLANEOUS

G-14.01 PROTECTION AGAINST SILTATION AND BANK EROSION

The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed watercourses and drainage ditches.

G-14.02 EXISTING FACILITIES

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Work shall be scheduled to minimize bypassing during construction. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

G-14.03 USE OF CHEMICALS

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

Specific Provisions

SP-1 Scope 3
SP-2 Intent 3
SP-3 Permits & Licensing 4
SP-4 Standard Drawings 5
SP-5 Temporary Water for Testing 5
SP-6 Construction Start 6
SP-7 Coordination and Cooperation 6
SP-8 Connections Between Construction Phases 6
SP-9 Use of Private Property for Temporary Construction Use 6
SP-10 Release of Facilities for Use 7
SP-11 Material and Equipment Approval 7
SP-12 Contractor Emergency Response Time 7
SP-13 Contractor's Field Office 7
SP-14 Salvage 7
SP-15 Sequence of Operations 8
SP-16 Project Sign 8
SP-17 Prevention, Control and Abatement of Erosion and Water Pollution 8
SP-18 Protection and Relocation of Gopher Tortoise(s)- VOID 10
SP-19 Demolition 10
SP-20 Dewatering 10
SP-21 Unauthorized Filling or Grading 11
SP-22 Storage of Materials 11
SP-23 Temporary Stockpiling 11
SP-24 Trench Maintenance 12
SP-25 Work Zone Cleanliness 12
SP-26 Road and Lane Closures, Traffic Control Plans 13
SP-27 Work in Streets and Highways 13
SP-28 Existing Public Facilities Restoration 14
SP-29 City Street Pavement Restoration 14
SP-30 Replacement of Traffic Markings and Signalization Loops 14
SP-31 Protection of Existing Utilities 14
SP-32 Conflict Structures 15
SP-33 House Services 15
SP-34 Short Tunnels 15
SP-35 Protection of Trees and Shrubs 16
SP-36 Lawn and Landscape Restoration 16
SP-37 Existing Sprinkler System 17
SP-38 Existing Drainage Facilities 17
SP-39 Inspection of Reinforced Concrete Pipe 17

SP-40 Elliptical Concrete Pipe and Round Concrete Pipe Joints 19
SP-41 Grouting Abandoned Sewers 19
SP-42 Temporary Pavement Restoration 19
SP-43 Alignment Survey Gravity Storm Sewer Pipe or Force Main Pipe 20
SP-44 City Testing 20
SP-45 Removal and Abandonment of Existing Sewer Systems within Pipeline Construction Payment Limits 20
SP-46 Reserved Parking Signs in Parking Meter Areas - VOID 21
SP-47 Work Directive Change 21
SP-48 Monthly Schedules 21
SP-49 Contingency 22
SP-50 Water Main Improvements 22
SP-51 Water Service Connections 22
SP-52 Protection of Water Service Lines 22
SP-53 Water Service Line Replacement 23
SP-54 Use of Site for Storage and Field Office 23
SP-55 Notice of Construction (Special Note for all FDOT Projects) - VOID 24
SP-56 Temporary Work Stoppages 24
SP-57 Project Photographs 24
SP-58 Project Videotaping 25
SP-59 Protection of Existing Buildings - VOID 25
SP-60 Storm Structure Inlet Elevations 25
SP-61 Sanitary and Storm Sewer Manhole Adjustment 25
SP-62 As-Built Plans 26
SP-63 Safety 27
SP-64 Post-installation Testing of PVC Gravity Sewer Pipe – VOID 30
SP-65 Special Road and Driveway Closure Requirements – VOID 30
SP-66 Single Source Providers 30
SP-67 Existing Flows – VOID 30
SP-68 Bypass Pumping – VOID 30
SP-69 Pump Characteristics – VOID 30
SP-70 Data to be Submitted on Pumping Station – VOID 30
SP-71 Interruption of Service – VOID 30
SP-72 New Electric Service 30
SP-73 Electrical Equipment Certification 31
SP-74 Electrical Work 31
SP-75 Operation and Maintenance Manual, Submittals / Request for Information / Shop Drawings, and Asset Tracking Form 32
SP-76 Programmed Controls Equipment 34
SP-77 Services of Manufacturers' Representatives 35

SP-1 Scope

The work under these Contract Documents includes the construction of a complete simplex stormwater pump station equipped with an emergency generator, all related site work, miscellaneous and appurtenant work.

To address long lead-time equipment delays during construction for key components of the project, the City has direct-purchased gensets comprised of diesel-powered generators in fiberglass enclosures with fuel tanks as well as automatic transfer switches which will be furnished to the contractor during the construction period. Additionally, the City has direct-purchased a pump and controls package consisting of pump(s) controls and accessories which will likewise be furnished to the contractor during the construction period. The Contractor will be responsible for coordinating the delivery by the vendor, receiving, protecting, off-loading, installing and all electrical work associated with connecting and rendering the equipment operational as intended by the contract documents. Bill(s) of Material are provided in these documents which describe the extent of items which are included in each of these direct-purchase packages.

The Contractor shall furnish all labor, materials and equipment for the accomplishment of all work, complete and in-place, as described herein, in the Technical Specifications and the Construction Plans and as directed by the Engineer in accordance with the obvious or expressed intent of the Contract.

For pumping stations, work also includes general cleanup, start-up and testing of all installed equipment to ensure satisfactory operation of the pumping station and all other work required by the Contract Documents necessary to make the pumping station complete and functional.

SP-2 Intent

It is the intent of these documents to fully describe the work required to complete the full intent of this project. Therefore, any work not specifically addressed in either the Plans or in the Specifications, but which is necessary to provide for the full and complete intent of the project, is required to be included and shall be performed by the Contractor in accordance with all requirements herein, as though it were specifically addressed. The cost of this work shall be included in the cost of the pay item to which it is incidental, and no additional payment will be made therefor.

Further, it is the intent of the contract documents to implement the project scope while maintaining beneficial operation of each pump station which allows it to function under normal operating conditions. Pump stations shall not be taken out of service except for temporary

periods not to exceed 2 hours at such times when no rainfall is forecasted. For longer periods, Contractor shall make accommodations for sufficient bypass pumping, backup generator power or other means necessary to provide for the stations to operate under normal operating conditions. All pump station outages shall be scheduled and coordinated in advance and receive approval from the City.

SP-3 Permits & Licensing

The City or its design consultant is responsible for obtaining permits, when required, from State, regional or County agencies and railroads having jurisdiction over the project area, as follows:

- USACOE Section 404 Wetlands Permit
- Statewide (FDEP/SWFWMD) Environmental Resource Permit
- Hillsborough County Environmental Protection Commission Wetlands Permit
- City of Tampa Tree Removal Permit
- City of Tampa Historic Preservation Approval

The Contractor is responsible for obtaining all other permits required to construct the project. The following permits will be obtained, when required:

- Florida Building Code Permit(s)
- FDEP NPDES Construction Generic Permit
- FDEP Dewatering Permit
- City of Tampa CWS or Hillsborough County ROW permit
- City of Tampa Tree Pruning Permit
- All other permits that may be required.

The Contractor shall be required to comply with all provisions of the permits, including those affecting workmanship, schedules, maintenance of traffic (see SP-24), notification of construction start and completion dates, pavement removal and replacement and other conditions under which each permit is issued.

The Contractor shall maintain full responsibility of any violation of the conditions of a permit under his control and shall work with the Authority Having Jurisdiction (AHJ) to correct any such violation. Any penalties imposed resulting from execution of this Contract shall be the responsibility of the Contractor.

The Contractor shall have in his possession the proper license to perform the work before

submittal of his bid and shall obtain any required City/County building permits and shall obtain and pay for all other licenses and authorizations required for the prosecution of the work, including the cost of all work performed in compliance with the terms and conditions of such permits, licenses and authorizations, whether by himself or others and pay all permit fees associated with the permits for which he is responsible.

The Contractor shall require all subcontractors to be currently licensed by the City to perform the proposed work in their respective fields and to obtain permits for the execution of said work. All work shall be performed in accordance with the licenses, permits and the requirements of the current Building and Construction Regulations Chapter of the City of Tampa Code.

The Contractor is responsible to schedule and coordinate with the Construction Services of the Contract Administration Department for all required inspections and tests for all phases of work to obtain final approval from the AHJ.

SP-4 Standard Drawings

The City of Tampa, Stormwater Engineering Division's Standard Drawings are available on the 6th Floor, North Wing of City Hall Annex, 306 East Jackson Street and online at https://www.tampa.gov/document/departmental-standards-25996.

The City of Tampa Transportation Engineering Division Pavement Restoration Standard is available on the 6th Floor, East Wing of City Hall Annex, 306 East Jackson Street and online at https://www.tampa.gov/document/city-tampa-pavement-restoration-standard-26101.

SP-5 Temporary Water for Testing

Supplemental to the requirements outlined in Article G-7.01 of the General Provisions, all reasonable amounts of water required by the Contractor for water main testing and flushing under this agreement will be furnished by the City from the existing water system without cost to the Contractor. The Contractor shall request temporary hydrant meters with backflow prevention devices when connecting to existing water system hydrants. A security deposit for the meter is required to be paid by the Contractor. The deposit will be returned when the meter is returned to the City. City Crews will install the meter with backflow-preventer on the hydrant. The Contractor shall make any necessary water supply connections at his own expense at a point designated by the City. These connections shall be maintained by the Contractor, who shall furnish all pipe, valves, and such other equipment necessary or required. Temporary piping may run above ground when there is no possibility of traffic, and it can be done safely. Otherwise, it must run underground and in such manner as to meet the approval of the City.

At the discretion of the City, unnecessary waste of water after notification will be cause for use of water to be discontinued. After temporary lines have served their purpose, they shall be removed by the Contractor and all connections closed or plugged to the satisfaction ofthe City.

SP-6 Construction Start

Construction will not begin prior to receipt by the City of the required permits or until all necessary equipment and materials are on-site. Completion of these efforts shall not be unduly delayed by the Contractor. If start of construction is delayed due to permit acquisition, the contract time will be extended by the number of days after Notice to Proceed date that the permit is issued, but no extra payment will be made to the Contractor.

SP-7 Coordination and Cooperation

In performing work under this Contract, the Contractor shall coordinate his work with that of any adjacent contractors for the City, and others, and cooperate with them in every reasonable way, to the end that there shall be the minimum practicable interference with their operations.

SP-8 Connections Between Construction Phases

The Contractor shall provide an approved masonry bulkhead, spigot plug, bell cap, or standard pipe plug in the sanitary or storm sewer pipe, manhole, junction chamber, or other location to provide for terminating construction when the work is performed in phases and the connecting phase is delayed or incomplete.

The Contractor shall remove any such bulkhead or plug encountered when connecting to previously completed work.

The cost of furnishing and removing bulkheads and plugs shall be included in the various Contract Items for pipe lines, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-9 Use of Private Property for Temporary Construction Use

If, in the opinion of the Contractor, obtaining a temporary construction easement or property rental, lease or use is necessary or desirable, it shall be the sole responsibility of the Contractor to obtain such use from the Owner of the property. If such use is obtained by the Contractor, it shall contain provisions to hold the City harmless from any operations of the Contractor within the use areas. The Contractor shall not conduct construction operations on

private property outside the limits of any temporary or permanent easement obtained by the City unless a copy of the temporary construction use agreement is filed with the City.

SP-10 Release of Facilities for Use

It is the intent of these Specifications that all newly constructed infrastructure and appurtenant facilities be placed in service as rapidly as possible. A portion of the project may be placed in service upon substantial completion of an agreed upon phase or segment once inspected and approved by the Engineer and the City. Acceptance or use by the City of any portion of the work prior to final acceptance shall not relieve the Contractor of any responsibilities for that work included in the Contract Documents.

SP-11 Material and Equipment Approval

The Contractor shall not enter into any subcontracts, or place any order, for the furnishing of any material or equipment until he has received the Engineer's written approval of the manufacturers.

SP-12 Contractor Emergency Response Time

Upon commencement of the work and until final completion of the project, the Contractor must be available to service emergency calls seven (7) days a week, twenty-four (24) hours a day. The response time for emergency calls shall be within two (2) hours. A contact person and telephone number shall be provided to the City for such purposes.

SP-13 Contractor's Field Office

Delete Article G-6.03 Contractor's Field Office on Page G-14 from GENERAL PROVISIONS. The Contractor’s superintendent or alternate approved by the City shall be present at all times while work is in progress. The Contractor shall maintain copies of the Contract Documents, submittals and supplemental instructions in a complete, organized and up-to-date manner at the job site.

SP-14 Salvage

All existing materials and appurtenances removed by the Contractor and which are not designated to be salvaged shall become the property of the Contractor and shall be removed from the site of the work to the Contractor's own place of disposal.

Items which are designated to be salvaged shall be removed by the Contractor, delivered, and unloaded at a location within the Department's service area, as directed by the City. The cost of removing, disposing, delivering, and unloading as salvage items of pipe and appurtenances shall be included in the various Contract Items or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-15 Sequence of Operations

The Contractor shall develop, with the Engineer's input and approval, a complete CPM schedule of the work which, in the opinion of the Engineer, will permit substantial completion of the work, in whole or in part, at the earliest possible date and will minimize disruption to the residents affected by the work.

Acceptance or use by the City of any portion of the work prior to final acceptance shall not relieve the Contractor of any responsibilities for that work included in the Contract Documents.

SP-16 Project Sign

The Contractor shall furnish a project sign as shown on the detail included herein and install it in the construction area as directed by the Engineer within 15 days of Notice to Proceed.

The cost of fabrication, erection, maintenance, removal, and proper disposal of the project sign at the completion of the project, including all labor and materials shall be deemed included in the prices bid for the various Contract Items of this Contract, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-17 Prevention, Control and Abatement of Erosion and Water Pollution

The Contractor shall be responsible for employing Best Management Practices (BMPs) for the prevention, control and abatement of erosion, siltation and water pollution resulting from construction of the project until final acceptance.

He shall provide, install, construct, and maintain any covering, mulching, sodding, sand bagging, berms, slope drains, sedimentation structures, silt and turbidity barriers and other BMPs necessary to meet City, County, State and Federal regulatory agency requirements.

Storm drainage facilities, both open and closed conduit, serving the construction area shall be protected by the Contractor from pollutant and contaminants. If the Engineer determines that

siltation of drainage facilities has resulted due to the project, the Engineer will advise the Contractor to remove and properly dispose of the deposited material and properly restore the area to pre-impacted conditions. Should the Contractor fail to or elect not to remove the deposits, the City will provide maintenance cleaning as needed and will charge all costs of such service against the amount of money due or to become due the Contractor.

Construction operations in rivers, channels, streams, tidal waters, canals and other impoundments shall be restricted to those areas where it is necessary to perform filling or excavation to accomplish the work shown in the Plans and to those areas which must be entered to construct temporary or permanent structures. As soon as conditions permit, rivers, channels, streams and impoundments shall be promptly cleared of all obstructions placed therein or caused by construction operations.

Except as necessary for construction, excavated materials shall not be deposited in rivers, streams, canals or impoundments, or in a position close enough thereto to be washed away by high water or runoff.

The Contractor shall not disturb lands or waters outside the limits of construction except as may be found necessary and authorized by the Engineer.

The location of and methods of operation in all detention areas, borrow pits, material supply pits and disposal areas furnished by the Contractor shall meet the approval of the Engineer as being such that erosion during and after completion of the work will not likely result in detrimental siltation or water pollution.

The Contractor shall comply with the applicable provisions of the Hillsborough County Land Development Code concerning grading, filling, excavation, soil removal, and the like, as amended.

The Contractor shall schedule his operations such that the area of unprotected erodible earth exposed at any one time is not larger than the minimum area necessary for efficient construction operations; and the duration of exposed, uncompleted construction to the elements shall be as short as practicable.

Clearing and grubbing shall be so scheduled and performed that grading operations can follow immediately thereafter and grading operations shall be so scheduled and performed that permanent erosion control features can follow immediately thereafter if conditions on the project permit.

The Engineer may limit the surface areas of unprotected erodible earth exposed by clearing and grubbing, excavation or filling operations and may direct the Contractor to provide

immediate erosion or pollution control measures to prevent siltation or contamination of any river, stream, channel, tidal waters, reservoir, canal or other impoundment or to prevent damage to the project or property outside the project right of way.

SP-18 Protection and Relocation of Gopher Tortoise(s) - VOID

SP-19 Demolition

The Contractor shall demolish, remove and dispose of at an offsite location all pipe, structures, pavement, sidewalks, driveways, curb, vegetation and other items shown on the Plans to be removed or otherwise necessary to construct the proposed improvements and/or as directed by the Engineer.

The Contractor shall fill or backfill excavations in accordance with the specifications.

The cost of this work, including all material, labor, equipment, etc., shall be included under the various Contract Items, or in the total Lump Sum Price, as applicable, and no additional payment shall be made therefor.

SP-20 Dewatering

Dewatering is the responsibility of the Contractor. All costs associated with dewatering shall be included in the appropriate contract price for items to which dewatering is incidental, or in the total Lump Sum Price, as applicable, and no separate payment shall be made therefore. Contractor shall apply for and obtain, at his cost, all Florida Department of Environmental Protection required permits associated with any proposed dewatering or wellpointing operation.

Before commencing any excavation at the site of the work, the Contractor shall submit to the Engineer and obtain his approval of the methods and equipment and arrangement of facilities proposed for the removal and disposal of water at the site and of all water entering any excavation or other part of the work from any source whatsoever. Adequate standby facilities shall be provided to ensure that the excavation will be kept dry in the event of power failure or mechanical breakdown. Facilities for removal and disposal of water shall be of sufficient capacity to keep the excavation dry under all circumstances with one-half of the facilities out of service. If well points are used, provision shall be made for removing and resetting individual well points without taking the system of which they are a part out of service. Wellpoint piping and discharge should not adversely affect citizens' access to their property. For construction areas within or adjacent to residential areas, day-night average sound levels from dewatering pumps shall be limited to 65dB(A) by the use of a noise abatement enclosure or other approved noise abatement system.

SP-21 Unauthorized Filling or Grading

The Contractor, under Sec. 21-27 (Permit Requirements) of the City of Tampa Code, is prohibited from filling or grading any area, public or private, (except where shown on the construction plans) anywhere within the City limits without a permit. Drainage patterns cannot be altered to the detriment of neighboring property owners or public rights-of-way. A copy of the permit shall be submitted to the Engineer by the Contractor prior to any filling or grading operation.

SP-22 Storage of Materials

Storage of materials shall be limited to the right-of-way area within the limits of the project or for phased projects, within the active construction phase. Within these limits, the Contractor may only use that portion of the right-of-way outside of existing or proposed pavement areas provided that this use does not obstruct pedestrian or vehicular traffic and conforms to the City's Tree Ordinance. If the area behind the curb line/off the edge of pavement is insufficient in size to accommodate the Contractor's storage needs, the Contractor is required to secure the use of a vacant parcel of land for use as a storage site for the duration of this project. Upon completion of the project, right-of-way shall be returned to pre-construction conditions and meet City Standards. All other storage areas will be restored to a condition which meets or exceeds the pre-construction condition to the Owner’s satisfaction. Payment for use and restoration of storage areas will be included in the appropriate lump sum pay items and unless the area is within the pipeline pay limits, no separate payment will be made therefor.

SP-23 Temporary Stockpiling

For temporary stockpiling of the excavated material within project limits (and anywhere within City limits), the Contractor shall follow the following procedure:

Public Right-of-Way

a. The Contractor will not be allowed to stockpile suitable, excavated material within right-of-way for a period in excess of 30 calendar days. Unsuitable excavated material shall not be stockpiled within public right-of-way for a period in excess of 7 calendar days.

Location other than Public Right-of-way

b. The Contractor shall:

1) Obtain the permission (in writing) from the owner of the property where stockpiling
is desired.

2) At his own expense present the above letter and a contour plan of the site to the Engineer for approval of the stockpiling site.

The time periods of stockpiling shall be specified by the Contractor in writing.

Upon removal of stockpiled material, the Contractor shall clean up and grade the site to its original contours and conditions.

The City of Tampa shall not be a party to the agreement between the Contractor and the property owner.

Regardless of the location of stockpiling, it shall be the Contractor's responsibility to make sure that stockpiling in no way constitutes a public hazard or nuisance and does not interfere with the natural surface runoff in the area and complies with the NPDES permit requirements, if applicable.

SP-24 Trench Maintenance

Trenches shall be protected at the close of each day's operations by lighted barricades, fences, and other methods to the satisfaction of the Engineer. Fences shall meet OSHA standards and be structurally stable as approved by the Engineer. No excavations shall be left open over a weekend.

In City**,** State and County highways, excavated materials shall not be stored or cast upon the pavement, unless an advance approval of the AHJ is first obtained by the Contractor.

SP-25 Work Zone Cleanliness

The Contractor shall always keep the work zone free of trash and debris. If the City observes that trash within a work zone becomes excessive, the Contractor will be required to deploy trash barrels or other approved methods within work zones sufficient to keep the area free of trash. It is the Contractor’s responsibility to keep the construction site neat and clean with trash and debris to be removed daily.

SP-26 Road and Lane Closures, Traffic Control Plans

The Contractor shall arrange his work in a manner that minimizes disruption to vehicular and pedestrian traffic. As deemed necessary, roadway and lane closures shall occur during normal business hours or as required by the Right-of-Way Use permit and the Contract Administration Department, Construction Division.

At least seventy-two hours before starting any work in City streets, the Contractor shall obtain a City of Tampa Street or Lane Closure Permit for any traffic lane or street closure within the City. The permit will establish the requirements for closures related to the number of lanes, time of day lanes or streets may be closed, and total duration of closures. Traffic control plan(s) which may be included in the construction documents provide a baseline plan and may identify expected detour routes. However, these plans are subject to review and approval through the Right-of-Way Use permitting process and should not be assumed to be final.

A detailed traffic control plan shall be prepared in accordance with MUTCD and the appropriate FDOT Traffic Control Drawings contained in the FDOT Standard Plans (102 Series Index), latest edition. The plan shall be submitted to the City of Tampa Smart Mobility Division with the application for the Street or Lane Closure Permit. The MOT plan shall include proposed detour and truck routes, as applicable, and locations and descriptions of traffic control signs for the construction area and detour routes. A copy of the Street or Lane Closure Permit shall be submitted to the Engineer before starting any work in City streets. No changes to the MOT plan will be allowed without prior Smart Mobility Division approval.

The Contractor shall furnish and maintain all signs, barricades, lights and flagmen necessary to control traffic and provide for safety of the public, all in compliance with the approved traffic control plan with subsequent revisions and additions, and to the satisfaction of the Engineer.

SP-27 Work in Streets and Highways

All work within streets and highways shall be subject to the regulations and requirements of the appropriate agencies. Within the City of Tampa, the authorities having jurisdiction (AHJ) over streets and highways are the City of Tampa Mobility Department, Hillsborough County Public Works, and Florida Department of Transportation.

Methods and materials of construction used in restoration within such streets and highways, including pavement, sidewalk, curb, curb and gutter removal and replacement, replacement of storm sewerage facilities, excavation and backfilling, and the storage of materials and equipment shall conform to the requirements of the respective AHJ and will be subject to the

inspection and approval of the AHJ.

SP-28 Existing Public Facilities Restoration

Existing public facilities that are removed by construction operations under this contract shall be replaced by the Contractor to City of Tampa specifications. These items shall include all public benches, light poles, shelters, roadway signs, and replacement of these items shall be considered incidental to the cost of construction, and no separate payment will be made therefor.

SP-29 City Street Pavement Restoration

City street restoration shall be performed in accordance with the details on the plans, the Technical Specifications and the latest editions of the City of Tampa Pavement Restoration Standards, City of Tampa Pavement Design Standards and the City of Tampa Transportation Technical Manual all maintained and periodically by the Mobility Department, Transportation Engineering Division.

SP-30 Replacement of Traffic Markings and Signalization Loops

The Contractor shall furnish all labor, equipment and materials to replace, test and maintain all traffic markings (temporary and permanent) and signalization loops removed or damaged by pipeline construction and appurtenant work as shown on the Plans, specified and directed by the Engineer.

The replacement of traffic markings (temporary and permanent), signalization loops and all appurtenant work shall be replaced by the Contractor in kind.

It shall be the Contractor's responsibility to field verify before construction begins all markings and signalization loops to be replaced.

All traffic markings and signalization loops shall conform to the Workmanship and Materials standards set forth in the latest edition of the Florida Department of Transportation Standard and Supplemental Specifications.

Payment for the replacement of temporary and permanent traffic markings, signalization loops and all appurtenant work shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment shall be made.

SP-31 Protection of Existing Utilities

The Contractor shall protect all utilities and other facilities within and adjacent to the construction as covered in Section G-1.03, unless a utility firm has conclusively indicated, or such is shown on the Plans, that the utility has been abandoned or certain adjustment, removal, reconstruction, or protection of the utility's facility will be performed by that respective utility.

The Contractor shall furnish, install, and remove sheeting and shoring, utilize trench boxes or other protective measures as may be necessary to satisfactorily accomplish the construction of the project. The cost of such measures shall be included in the unit prices as bid for the work being installed, and no separate payment shall be made therefor.

SP-32 Conflict Structures

Where a sanitary sewer line runs through a conflict structure, the portion of sanitary sewer spanning the structure shall be PVC encased in a steel sleeve. The annular space between the PVC pipe and the steel sleeve shall be sealed at each end as shown in the plans and contract documents. Payment shall be made under the appropriate conflict structure item. Unit bid price in this case shall reflect the PVC pipe, steel sleeve, etc., required to meet the above requirements and the standard details.

When a water main is carried through a conflict structure, the water line shall be encased in a steel sleeve. The diameter of the sleeve pipe shall be such as to allow about one inch (1") minimum clearance all around the existing water main (including bells). Payment shall be made under the appropriate conflict structure item. Bid price for such structures shall include all costs for furnishing and installing such steel sleeve.

SP-33 House Services

The Contractor shall maintain all utilities and house service connections on a continual basis. Any required work to municipal service lines (water and sewer) shall be performed in a manner that will minimize disruption of service to customers, the time of disruption will be subject to the approval of the Engineer. Any public or private utility services damaged by the Contractor will be repaired by the utility having jurisdiction and the cost of such repairs shall be borne by the Contractor.

SP-34 Short Tunnels

Sewers or force mains shall be constructed in short tunnels when determined necessary by the Engineer to protect trees, shrubs, and existing surface or subsurface utilities and structures. Short tunnels shall be constructed to the lengths specified and directed in writing by the Engineer. Separate payment for short tunnels will not be made but shall be included in the Contract Unit

Price for which the short tunnel is incidental.

SP-35 Protection of Trees and Shrubs

All trees and shrubs, except where otherwise shown or ordered, shall be adequately protected by barricades, fences as indicated on the Plans, or otherwise carefully supported, as necessary, by the Contractor. Protective barricades shall be placed around all protected trees and grand trees and shall remain in place until all construction activities are completed. Refer to the tree permit issued by the City's Natural Resources Division for inspections after tree protection devices have been installed and prior to construction. No excavated or backfill material shall be placed in a manner which, in the opinion of the Engineer, may result in damage to trees or shrubs. Prior to mobilization, all exposed roots shall be covered with a two (2)-inch layer of mulch. The Contractor shall replace all trees or shrubs which are destroyed or damaged to such extent, in the opinion of the Engineer, to be considered destroyed. Replacement of damaged or destroyed trees or shrubs shall be made with new stock conforming to the requirements of the City's Tree Ordinance at the expense of the Contractor, and no separate payment will be made therefor.

Beneath trees within the limits of the excavation, and where possible, pipelines shall be built in short tunnels, except as otherwise shown or specified. When the tree is outside the limits of the excavation but, where the distance from the centerline of the new pipeline to the trunk of any tree is such that, in the opinion of the Engineer, the excavation would result in serious damage to the tree, the pipeline shall be constructed in short tunnel, as ordered in writing by the Engineer. The Contractor shall be responsible for all damage to trees and shrubs as a result of his operations, whether the pipeline is placed by trenching, tunneling, or other excavation.

The Contractor shall provide the services of an approved licensed tree professional when it is necessary to trim or cut a branch from a tree.

The cost of protection of trees and shrubs, replacement or repair of trees or shrubs destroyed by the Contractor, short tunnels, and cutting or trimming of tree branches shall be included in the various Contract Items for pipelines, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-36 Lawn and Landscape Restoration

Where construction activities are conducted in existing grassed areas, the grassed areas shall be restored as specified or directed by sodding or grassing. Such restoration of grassed areas shall conform to the requirements of the Workmanship and Materials section headed "Lawn Replacement."

The Contractor shall replace or repair all ground surfaces damaged during construction. Areas shall be regraded in conformance with the plans or to pre-impacted conditions. Any bushes, flowers, gardens, patios, or other landscaping and irrigation systems disturbed by the construction project shall be repaired or replaced by the Contractor. The cost of such ground surface repair shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-37 Existing Sprinkler System

It is required that the Contractor walk the project prior to bid to determine the scope and extent of sprinkler systems that will be impacted by his work method. Existing sprinkler systems for lawns within the City right-of-way shall be protected or, if disturbed, replaced by the Contractor. All sprinkler systems shall be replaced with those of equal or better quality as approved by the Engineer. The replacement of sprinkler systems shall include all necessary parts, labor, equipment, etc., to complete the existing sprinkler system in operating condition.

The cost of protection and/or replacement of existing sprinkler systems shall be included in the contract unit price as bid for the various items, or in the total Lump Sum Price, as applicable, and no separate payment shall be made therefor.

SP-38 Existing Drainage Facilities

The Contractor shall protect all existing drainage facilities within the work zone. When approved by the Engineer, relocation or special maintenance of drainage facilities during construction will be permitted. Disruption of service shall be kept to a minimum.

Facilities which are damaged by the Contractor shall be replaced by the Contractor to such limits as directed by the Engineer. Replacement work shall conform to City Standards. Work done outside the City shall conform to the standards of the AHJ.

The cost of protecting, replacing, relocating and maintaining drainage facilities shall be included in the various Contract Items for pipelines, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor, unless otherwise specified in other Contract Items.

SP-39 Inspection of Reinforced Concrete Pipe

All reinforced concrete pipes, reinforced concrete arch culverts, storm drain, and sewer pipe, and all reinforced concrete elliptical pipe shall be inspected and accepted by a testing laboratory approved by the Engineer. At the completion of the installation of the stormwater

system and prior to roadway construction, all pipes and structure will be video inspected per details in SP - 92

Each pipe shall bear the stamp of acceptance of the testing laboratory and the Engineer shall be supplied with a copy of each inspection report, including a certification of "D-load," absorption test, conformance to the dimensional requirements, and all other designations of ASTM specifications. The cost of such inspection services shall be included in the unit prices for the respective pipe items.

Unless specified otherwise on the Plans, or directed by the Engineer, all storm sewer pipes shall be ASTM Class III, B wall thickness.

Prior to the manufacture of any reinforced concrete sewer pipe, details of the steel reinforcing and concrete strength together with proof of the adequacy of the pipe design for each size and class of pipe shall be submitted to the Engineer for approval.

As proof that the design of the pipe meets the 0.01-inch crack and ultimate load strength requirements for this class of pipe, the manufacturer shall submit the results of properly certified three-edge-bearing tests already witnessed and verified by an approved independent testing laboratory on identical pipe of identical design or, if such three-edge-bearing test results are not already available or are not acceptable, shall have one pipe, at least four feet in length, tested in three-edge-bearing and witnessed and verified by an approved independent testing laboratory and shall submit certified test results. All costs associated with proof-of-design tests shall be borne by the Contractor.

Concrete sewer pipe shall be tested in accordance with the applicable provisions of ASTM Des: C 497 as required by the ASTM Specification for the pipe.

The basis of acceptance for reinforced concrete pipe shall be in accordance with Section 5.1.1 of ASTM Des: C 76 (round pipe) or ASTM Des: C 507 (elliptical pipe). During manufacture, at least one pipe section shall be shop tested to destruction in three-edge-bearing in the presence of an approved independent testing laboratory for each 1,000 feet of pipe or fraction thereof made. The test pipe sections shall be a minimum of four feet in length. The manufacturer shall have a pipe casting form, of the same inside diameter as the pipe being manufactured, together with the proper reinforcing steel cages, available at all times during manufacture for the purpose of casting test pipes at the times designated by the Engineer. Test pipe sections shall not be lined with plastic sheet. No pipe shall be tested at an age of less than 12 days, and no pipe shall be delivered to the job site until satisfactory completion of shop tests on representative pipe specimens for each 1,000-foot lot of pipe manufacturer. Proof-of-design tests performed on pipe manufactured for this Contract will be accepted by the City in lieu of shop tests for the first 1,000- foot lot of pipe

of each size and class manufactured. This test must be within one (1) year of shipment for each size and class of pipe.

The basis for acceptance of nonreinforced concrete pipe shall be in accordance with Section 4.1 of ASTM Des: C 14.

The Contractor shall obtain, review and submit to the Engineer four (4) copies of certified test reports made by the City's inspection engineer. All costs associated with shop testing shall be borne by the Contractor.

SP-40 Elliptical Concrete Pipe and Round Concrete Pipe Joints

All joints in elliptical concrete pipe and round R.C.P. shall be provided with filter fabric or concrete jacket as per D.O.T Standard Index No. 280 and as directed by the Engineer. Filter fabric shall be provided at all joints, except the last two joints not supported by a structure; these joints shall be provided with a concrete collar.

The cost of the filter fabric jackets and concrete collars shall be included in the unit cost of pipe. No extra payment will be paid for such jackets or collars.

SP-41 Grouting Abandoned Sewers

The Contractor shall pump a lean mixture of grout into sewers as shown on the Plans and as directed by the Engineer. The grout shall be a mixture of flyash and cement, the ratio of which shall be submitted to the Engineer for approval. The air-entraining admixture shall be permitted per Section 924. The grouting shall be installed by pumping.

This work shall be carried out after the replacement sewer is complete and functional.

The Contractor shall take measures to ensure the pipe is completely filled with the grout. Such measures may consist of constructing temporary stand pipes, grout injection tubes, or other measures approved by the Engineer and as directed in the Workmanship and Materials section. The Contractor shall also construct approved plugs into the ends of the abandoned sewers. All costs to construct the plugs, stand pipes, grout injection tubes (or other approved measures), and any other necessary steps to provide for a complete item shall be included in the unit cost of the grout, and no additional payment shall be made therefor.

SP-42 Temporary Pavement Restoration

No portion of the work shall be left more than fourteen (14) days without temporary

pavement surface; however, the Engineer may require that temporary pavement surface be installed sooner to ensure that no more than five hundred (500) linear feet of road is inaccessible at one time. Payments on installed pipe of up to fifty percent (50%) of the unit price can be retained by the Engineer until a crushed concrete or limerock base material along with a sand seal temporary pavement surface is provided. The Engineer can restrict further pipe laying if satisfactory and on-going street restoration is not performed by the Contractor. Temporary work shall be maintained in a suitable and safe condition for traffic until the permanent pavement is laid, or until final acceptance of the work.

SP-43 Alignment Survey Gravity Storm Sewer Pipe or Force Main Pipe

The Contractor shall employ the services of a Land Surveyor, registered in the State of Florida, to stake out the alignment of the new gravity storm sewer pipe, gravity sanitary sewer pipe, or force main. All manhole locations or horizontal points of intersection, deflection angles, proposed manhole rim elevations, and proposed finished roadway elevations at the manholes shall be noted in the survey with their respective field stations. In the event of discrepancies between the stationing shown on the Plans and that obtained by the actual field survey, the Contractor shall notify the Engineer. The Engineer will advise the Contractor of any appropriate adjustments in alignment of the sewer or force main, or locations of manholes or horizontal points of intersection. The alignment survey must be submitted to the Engineer and approved by him prior to submitting shop drawings on manhole, structures, inlets, etc.

The Land Surveyor shall also establish alignment offset hubs at 100-foot intervals as directed by the Engineer. The Contractor shall protect these hubs from displacement or damage during construction. Any offset hubs damaged or displaced shall be reset by the Land Surveyor to the satisfaction of the Engineer.

The cost of the survey and establishing and resetting offset hubs shall be included in the respective unit price Contract Item, or total Lump Sum Price, as applicable, and no additional payment will be made therefor.

SP-44 City Testing

The cost of retesting materials and/or workmanship, which has been initially tested by the City and found to be unacceptable, is to be borne by the Contractor.

SP-45 Removal and Abandonment of Existing Sewer Systems within Pipeline Construction Payment Limits

The cost of removal or abandonment of existing sewer systems within pay limits including,

but not limited to, pipe, inlets, manholes, manhole frames and covers, catch basins, and any other appurtenances as well as the cost to grout or sand-fill any pipe or manholes, where specified on the Plans, shall be included under the various Contract Items for pipelines, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

Removal or abandonment of existing storm or sanitary sewer systems outside the sewer system pay limits, as shown on the Plans and directed by the Engineer, shall be paid for at the appropriate Contract Unit Price, or in the total Lump Sum Price, as applicable.

SP-46 Reserved Parking Signs in Parking Meter Areas - VOID

SP-47 Work Directive Change

A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, but is evidence that the parties expect that the change directed or documented by an Authorization to Proceed with Extra Work letter will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the contract price or the time for completion.

Without invalidating the Agreement, additions, deletions or revisions in the work may, at any time or from time to time, be authorized by a Change Order or a Work Directive Change. Upon receipt of any such document, the Contractor shall promptly proceed with the work involved.

SP-48 Monthly Schedules

In addition to the Progress Schedule required in Article 4.02 of the Agreement, the Contractor shall submit a monthly schedule with each pay estimate. Pay estimates will not be processed unless accompanied by an updated monthly schedule. The schedule shall be broken down into the following components:

1. Well pointing
2. Main line pipe installation
3. Lateral pipe
4. Subgrade and Base work
5. Paving
6. Final Restoration

SP-49 Contingency

A contingency sum, included in the bid form as part of the total bid amount for this contract, is for the purpose of compensating the Contractor to address any additional work that may arise as construction operations proceed as a result of unforeseen or work that could not have been anticipated at the time of bidding or as otherwise requested by the Owner. The contingency sum is an upset limit. Contractor shall submit a request to the Owner for consideration which includes adequate justification and a proposal for the work with appropriate backup documentation. The contingency sum shall be paid only after the proposal amount has been approved by the Owner.

SP-50 Water Main Improvements

All Water Main Construction, relocation, and related operations shall be performed in compliance with the City of Tampa Water Department Technical Standards, attached hereto as "Water Main Improvements," beginning on Page WM-1.

SP-51 Water Service Connections

During the course of the work, some existing water service connections will be disrupted or designated to be reconstructed/relocated due to the construction. When the water main is designated to be replaced in the contract Plans, the reconnection of the existing service line to the new water main will be paid for at the contract unit price per each connection one time only. All connections shall be transferred/relocated as per current City of Tampa Water Department, Technical Standards.

Copper and polyethylene service lines which are in good condition may be continued in use at the same location as determined by the Engineer. At locations where the streets are to be reconstructed, water lines shall have a minimum of thirty-six (36) inch cover.

SP-52 Protection of Water Service Lines

The Contractor shall protect all water service lines, including those which are to be replaced, in order to minimize interruption of service to the customer. If the Contractor damages a service line which is shown on the plans, is in line with a meter box, or that has been marked in the field, then he shall immediately replace the service line per Tampa Water Department (T.W.D.). Specifications from main to meter including curb stop, making all connections, and all appurtenant work required to restore service.

The Engineer shall determine which lines, if any, are to be replaced due to damage caused

by the Contractor, and no separate payment shall be made therefor.

SP-53 Water Service Line Replacement

Any water service line that is not copper or polyethylene shall be replaced by the Contractor per Tampa Water Department (T.W.D.) Specifications from main to meter including curb stop. The Contractor shall be compensated for this work under the appropriate Contract Item.

All copper service lines, including those having a meter box which will remain in a driveway undisturbed by construction, shall remain in service and be protected in place by the Contractor.

If the Contractor desires to temporarily disconnect the service line due to construction methodology, he must submit a written request to the Engineer at least three (3) working days prior to the proposed disconnect. If approved, the service line shall be removed from main to meter including curb stop. The Contractor shall provide twenty-four (24) hour written notice to the consumer prior to the service interruption.

Some meter boxes may be designated to be relocated outside of a driveway if the driveway is disturbed by construction. If so, a new service line shall be installed per T.W.D. Specifications from main to meter including curb stop. Schedule 40 PVC pipe shall be used to reconnect the consumer at the existing point of connection. The PVC pipe shall be extended from the downstream side of the meter to the consumer's existing point of connection. The old service line shall be cut and plugged at the main.

Service lines falling within four (4) inches of the proposed base or subbase material shall be lowered in place. Couplings shall not be used to achieve sufficient depth. If the required depth cannot be achieved without the use of couplings, a new service line shall be installed by the Contractor from main to meter as specified herein. The Contractor shall be compensated for this work under the appropriate Contract Item.

SP-54 Use of Site for Storage and Field Office

Space, on the site, for storage and field office for the Contractor shall be as directed by the Engineer. Any structures or facilities needed for storage or field office shall be constructed by the Contractor at his own expense and no separate payment will be made therefor. All security requirements for such facilities shall be provided and maintained by the Contractor.

Upon completion of the work, and as directed, the Contractor shall clean up the areas, remove any temporary facilities and finish grade as necessary, all as approved.

SP-55 Notice of Construction (Special Note for all FDOT Projects) - VOID

SP-56 Temporary Work Stoppages

The Contractor shall temporarily discontinue all construction activities from, and including, Thanksgiving Day through the following Sunday, and December 24 through January 2.

Prior to temporary work stoppages, all streets shall be restored to permit access to all businesses and residences and to allow ingress and egress by local traffic only. The Contractor shall maintain all streets at this condition level for the duration of the shutdown period.

All equipment, except that used for excavation and well pointing, and all materials including, but not limited to, manhole structures, pipe, and stockpiled material shall be removed to either the Contractor's storage lot or to a location outside the project area as approved by the Engineer.

The Contractor will also be required to accommodate the annual Gasparilla Parade and Gasparilla Run by ceasing construction activities and providing ingress and egress to allow local traffic only. The time limits for these requirements shall be from one day before to one day after the Gasparilla Parade and the Gasparilla Run. Accommodation of these events will entail restoration of all streets to at least a sand seal coat of crushed concrete or limerock base. All equipment, except that used for excavation and well pointing, and all materials including, but not limited to, manhole structures, pipe, and stockpiled material shall be removed to either the Contractor's storage lot or to a location outside the project area as approved by the Engineer.

All costs associated with furnishing labor, equipment, temporary pavement restoration, demobilization, mobilization, signage, barricades, clean-up, security, and any other incidentals required to accommodate the Thanksgiving, Christmas and New Years' Holidays and Gasparilla Parade and Race shall be included in the various contract unit prices, and no additional payment shall be made therefor.

SP-57 Project Photographs

The Contractor will not be required to furnish photographs of the project; however, the Engineer may or may not take photographs of the area immediately prior to and after completion of the construction for record and information. To assure that there will not be any conflict with this photography, the Contractor shall not perform clearing operations or action which will disturb any street or area within the project until the Engineer has been advised thereof and has had adequate opportunity to perform the desired photography.

SP-58 Project Videotaping

The existing conditions of the roadway and adjacent property, including driveways, landscaping, etc., have been recorded on videotape with reference to the survey base lines in the project area. These videotapes shall be available to the Contractor for reference upon request.

----OR----

Prior to commencing work, the Contractor shall submit to the Engineer for approval, a DVD containing a continuous color video recording including complete coverage of pre-construction conditions of all surface features within the construction's zone of influence, (including detour routes) simultaneously produced audio commentary and electronic display of time and date. The video recording shall be sufficient to fulfill the technical and forensic requirements of the project and provide continuous unedited coverage, establishing locations and viewer orientation with clear, bright, steady and sharp video images with accurate colors free of distortion or other imperfections. The DVD must be accompanied by a detailed log of its contents including date, locations, video counter numbers and features. No work shall be allowed until the completed DVD and log are approved by the Engineer.

At the conclusion of installation of the stormwater system and before the installation of the sidewalk and roadway, Contractor will conduct a video inspection of the stormwater system and provide a DVD and written log of the inspection for review and approval of the Engineer. Video inspection shall comply with FDOT specification section 430-4.8.1.

SP-59 Protection of Existing Buildings - VOID

SP-60 Storm Structure Inlet Elevations

For structures installed to match existing conditions, Contractor shall consider manhole top, grate inlet top and curb inlet throat elevations approximate and either verify the elevations before ordering precast structures or order structures at least six (6) inches lower than the grate or throat elevations and cast in place the remaining height to attain required elevations to match existing conditions. No additional payment will be made for this work.

SP-61 Sanitary and Storm Sewer Manhole Adjustment

The Contractor shall adjust all existing sanitary or storm sewer manholes within area of pavement restoration or mill and overlay and directed by the Engineer, to match the proposed new roadway surface. All manhole lids shall be flush with finished grade or not more than one-half inch below finished grade.

All costs associated with manhole adjustment shall be included in the various Contract Item Unit Prices for pipelines, and no separate payment shall be made therefor.

SP-62 As-Built Plans

During manufacture and construction, installation and testing, records shall be kept of any changes or adjustments made in the work. All such changes shall be incorporated in the "As-Built" plans, shown in red.

All As-Built information shall be annotated by a Florida Registered Professional Surveyor and Mapper on a separate layer of each AutoCAD drawing file of the construction plans as provided by the City. Annotation of the new drawing files shall be in accordance with City of Tampa Mobility Department drafting standards, as well as the Standards of Practice / Minimum Technical Standards set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 5J-17, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes. Settings shall be as follows: Color: CYAN, Line Type: CONTINUOUS, Font: ROMANS, Layer Name: AS-BUILT, AutoCAD Menu Name: ACAD.MNU, and File Format: AUTOCAD latest version.

All surveys shall be completed and certified by a Florida Registered Professional Surveyor and Mapper hired and/or employed by the Contractor, and shall be in accordance with the Standards of Practice / Minimum Technical Standards set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 5J-17, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes. Survey data shall be submitted as an electronic data file in AutoCAD latest version and an electronically signed/sealed survey in pdf format. The Contractor shall also include as supporting data the ASCII files of digital raw survey data, closure reports, adjustment reports, and/or copies of any hand written field notes or sketches.

“As-Built”, or “Record”, surveys, as may be required by contract, or agreement, shall consist of survey data collected on all constructed improvements, so they may be compared to and contrasted with the design plans and/or construction drawings. The annotated disk shall delineate all changes and deviations to the planned improvements within the project limits, to include, but not be limited to, pavement, curb & gutter, sidewalk, driveways, inlets, manholes, all piping, inverts, ditches, ponds, valves, hydrants, water meters, signalization, hand holes, signing & pavement marking, landscaping, and irrigation. All changes and deviations shall be

delineated by Station-Offset and vertical alignment values (or in the same format as depicted on the construction plans) and shall be clearly shown on the drawing files.

The Contractor shall comply with the above requirements and shall submit two (2) check print sets of the plans at the same scale as the construction plans, and all the supporting survey data files, to the Engineer for review within three weeks of substantial completion of the project. Final payment for the project shall not be made until the As-Built information is received for review, any corrections are made, and approval granted by the Engineer. Upon approval, the Contractor shall provide the final As-Built drawings on the disk, at the same scale as the construction plans. These files shall be AutoCAD Drawings, a copy in Adobe PDF, and two (2) hard copies signed and sealed with the As-Built information in red.

The cost for this work shall be included in the contract price for Mobilization and no separate payment shall be made for meeting the above As-Built requirements.

SP-63 Safety

A. Responsibility: Employees shall immediately report any unsafe work practice or unsafe condition to their supervisor(s). The Contractor is solely responsible for the safety of its workers, and shall comply with all applicable requirements [i.e.: 29 CFR 1910 -Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction, etc] and industry safety standards while at the work site. The fact that City personnel may bring un-safe conditions to the attention of any member of the Contractor's work force does not relieve the Contractor of this responsibility.

The Contractor shall have a designated Safety Officer within its organization. At the Pre-Construction meeting, the Contractor shall provide the name and contact information of the Safety Officer to the Engineer.

At the Pre-Construction meeting, the Contractor will be given pertinent safety related information, necessary forms and instructions (i.e.: AWTP Lockout/Tagout Procedures, AWTP Hot Work Permits, etc) that pertain to any work that might be utilized during the contract. The Contractor shall be responsible to disseminate that information to its employees and sub-contractors. Special care shall be taken by the Contractor to ensure that any new employee or sub-contractor to the work site shall be briefed on these safety instructions.

If warranted by the project and directed by the Engineer, the Contractor shall develop and implement a comprehensive health and safety plan for its employees that will cover all aspects of onsite construction operations and activities associated with the Contract. This plan must comply with all applicable health and safety regulations and any project specific requirements

specified in the Contract.

B. Incident Reporting: All accidents that result in personal injury, illness or property damage shall be immediately reported and investigated, regardless of the extent of injury, illness or property damage. Employees must report accidents within one hour (or as soon as practical) from the time of occurrence to their immediate supervisor, who in turn will report it to the City's inspector. The City inspector will record the incident in the daily report and report it to the Risk Management Division (274-5708).

C. Air-Borne Debris: All personnel in proximity to drilling, sawing, sanding, scraping, spraying, power-washing or other work being done, either in enclosed spaces or in the open, that creates dust or air-borne debris shall wear eye protection [29 CFR 1910.133] and a respirator [29 CFR 1910.134].

D. Hot Work: All welding, soldering, brazing, acetylene cutting or any other work at the AWTP or any pump station that produces high temperatures shall require a AWTP "Hot Work Permit" and may require one or more fire watches. The number and location of fire watches (if any) shall be a condition of the Hot Work Permit. A current, portable, fully charged fire extinguisher shall be located with each person performing hot work and each fire watch. The Hot Work Permit shall be signed off by the appropriate personnel and maintained in the project file.

E. Confined Spaces: OSHA defines a confined space as having limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. Confined spaces include, but are not limited, to vaults, tanks, manholes, wet-wells, pipelines, utility tunnels, etc.

The Contractor shall take measures [29 CFR 1910.146 (c)(5)] to ensure that atmospheric conditions in confined spaces are not hazardous to occupants. This can be accomplished by forcing a sufficient amount of clean air through the confined space and testing the atmosphere by using a portable certified, calibrated, atmosphere monitor that meets OSHA requirements [29 CFR 1910.146(c)(5)(ii)(C)]. The atmosphere monitor should record oxygen content, flammable gases and vapors and toxic air contaminants, such as the Industrial Scientific TMX-412.

F. Air-Borne Gases: The AWTP is located in an industrial area and, as such, there are several different substances, either on or off site, that can escape and become dangerous fumes, such as chlorine, methanol, anhydrous ammonia, etc. The AWTP currently has nine (9) Shelter In Place (SIP) locations that are designated as safe havens in the event of release of hazardous gases. These SIP's are stocked with necessary instructions and supplies to protect City and any Contractor's personnel.

The first day on site, City personnel will show all the Contractor's personnel present where the several closest SIP's are located, explain the alarm signals and provide the current alarm testing schedule. It shall be the Contractor's responsibility to show any future employee and/or sub-contractor that comes on site the location of the SIP's and explain the alarm signals.

In the event of an alarm, the Contractor's personnel shall immediately and hastily proceed to the nearest SIP along with the City personnel and remain there until further notice, taking guidance from and following the instruction of the senior City employee present.

G. Lockout / Tagout Policy: The AWTP Lockout / Tagout program is designed to set standards to help safeguard all employees from hazardous electrical or mechanical energy while they are performing service or maintenance on machines and equipment at the AWTP or any pump station. This program will also identify the practices and procedures to shut down and Lockout or Tagout machines and equipment. The Contractor shall be given a copy of the AWTP "LOCKOUT / TAGOUT POLICY AND PROCEDURES" instruction and shall make all of his employees and sub-contractors aware of this program.

No padlock (lockout) shall be removed except by the individual that installed it or, if not available, by a City of Tampa AWTP team leader.

No tag (tagout) shall be removed except by the individual who installed it or, if not available, by a City of Tampa AWTP team leader, except in an Emergency when the tag states "Do Not Use Unless in an Emergency". In that event, the Contractor shall notify the City of Tampa AWTP team leader who will prepare the necessary follow up report.

H. Trench Safety: Any excavation deeper than four (4) feet shall adhere to the requirements contained in 29 CFR 1926.650 thru 652 and the Florida Trench Safety Act [Florida Statutes, ss 553.60 - 553.64].

I. Explosives or Open Flames: No explosives or fires shall be allowed. No open flames necessary for any construction activity shall ever be left un-attended. A current, portable, fully charged fire extinguisher shall be located with each activity requiring an open flame.

J. Sparks: Any activity lasting more than 10 continuous minutes that creates sparks, such as grinding or chipping, shall have a dedicated fire watch in attendance. A current, portable, fully charged fire extinguisher shall be located with each activity creating sparks, regardless if a fire watch is required or not.

K. First Aid: The Contractor shall furnish appropriate First Aid Kits [29 CFR 1910.151] and shall

be responsible to ensure its employees are properly trained to render first aid. If injurious corrosive materials are to be utilized, eye wash and body wash facilities must be provided in the immediate area.

L. Related Costs: All costs associated with these, or any safety measures shall be included in the total lump sum contract price or the various contract item unit prices, as applicable, and no separate payment shall be made therefor.

SP-64 Post-installation Testing of PVC Gravity Sewer Pipe – VOID

SP-65 Special Road and Driveway Closure Requirements – VOID

SP-66 Single Source Providers

This project will include equipment or materials to be provided by single sources as authorized by the Certificates of Conditions and Circumstances which are on file in the office of the Stormwater Department.

SP-67 Existing Flows – VOID

SP-68 Bypass Pumping – VOID

SP-69 Pump Characteristics - VOID

SP-70 Data to be Submitted on Pumping Station - VOID

SP-71 Interruption of Service – VOID

SP-72 New Electric Service

"The Contractor shall provide, at his own expense, temporary lighting and power facilities required for the proper prosecution and inspection of the work. If, in the opinion of the Engineer, these facilities are inadequate, the Contractor will not be permitted to proceed with any portion of the work affected thereby." (General Provisions G-7.02.)

Prior to construction, the City will pay TECO an installation fee for new service, which will be good for the duration of the contract. Any additional fees required shall be the responsibility of the Contractor.

The installation of the new permanent electrical service as well as any coordination with the City

or County electrical inspection and with Tampa Electric Company shall be solely the responsibility of the Contractor. TECO will not perform any work without all fees being paid and a passing electrical inspection by the AHJ.

SP-73 Electrical Equipment Certification

All equipment and materials shall be UL listed or listed and labeled as complying with the requirements of a Southern Building Code Congress International, Inc. (SBCCI) recognized testing laboratory, for the particular application, whenever available.

An electrical/mechanical system that is not available as a standard UL listed assembly (e.g. industrial equipment of unique configuration or custom design) shall be composed of listed components, whenever they are available, and constructed in accordance with the design documents, and the latest nationally recognized industry standards. The Contractor shall certify in writing that the equipment satisfies the above requirements and that it has been installed in compliance with the latest edition of the National Electrical Code (NEC) and Chapter 5 of the City of Tampa Code. The certification shall be submitted to the City's Electrical Inspection Bureau, with a copy sent to the Sanitary Sewer Department's Resident Engineer, prior to final inspection. A sample certification document is attached to these Specific Provisions as a formatting guide.

The Contractor shall secure all required permits and arrange for progress and final inspections as the work develops.

SP-74 Electrical Work

Where definite requirements are not set forth in the Specifications, all electrical equipment, materials, and work under this Division shall comply with the requirements of the Occupational Safety and Health Act (OSHA) and shall be in accordance with applicable ANSI, IEEE, IPCEA, and NEMA standards. The work shall be performed in compliance with the latest issue of the NEC, all applicable state and municipal regulations and codes, and the service rules of the Tampa Electric Company, unless otherwise specified or directed. All equipment and materials shall be listed and labeled as complying with the requirements of a Southern Building Code Congress International (SBCCI) recognized testing laboratory for the particular applications wherever available.

Where listing is not available for the device as a whole, refer to the provision entitled "Electrical Equipment Certification" for submittal requirements.

SP-75 Operation and Maintenance Manual, Submittals / Request for Information / Shop Drawings, and Asset Tracking Form

Operation and Maintenance Manuals

The Contractor shall prepare and submit to the Engineer four (4) hardcopies and one (1) high resolution color, bookmarked, and unsecured electronic portable document format (PDF) of an Operation and Maintenance Manual for all equipment and associated control systems furnished and installed under this Contract. Black and white copies will not be accepted. When the work reaches 75 to 80 percent completion, the Contractor shall submit to the Engineer for approval one (1) hardcopy and (1) PDF electronic copy of the manual with all specified material that is available at that time. The submittal shall accompany the Contractor's partial payment request for the specified completion. Within 30 days after approval of the Engineer of the PDF submittal, the Contractor shall furnish to the Engineer four (4) hardcopies of the manual. Appropriate space shall be left in the manual for material not available at the time of submittal. All missing material for the manual shall be submitted with the request for final payment.

Also along with the missing material submitted with the request for final payment, one electronic copy (in pdf format) complete with all the missing material to be included in the earlier submitted hard copies shall be submitted.The manual shall be prepared and arranged as follows:

1. Space shall be provided in the manual for a reduced set of record Contract Drawings, size approximately 11 by 17 inches and folded to 8-1/2 by 11 inches. Drawings will be furnished by the Engineer.

2. One copy of all approved shop drawings and diagrams for all equipment furnished. The shop drawings and diagrams shall be reduced to either 8-1/2 by 11 inches or to 11 inches in the vertical dimension and as near as practicable to 17 inches in the horizontal dimension. Such sheets shall be folded to 8-1/2 by 11 inches.

3. One copy of manufacturer's operating, lubrication and maintenance instructions for all equipment and controls furnished. All equipment operating, lubrication and maintenance instruction and procedures shall be furnished on 8-1/2 by 11 inch commercially printed or typed forms. Such forms shall include equipment name, serial number and other identifying references.

4. One copy of manufacturer's spare parts list for all equipment furnished and prepared as specified in No. 3 above.

5. One valve schedule, giving the valve number, location, fluid and fluid destination for each valve installed and prepared as specified in No. 3 above. All valves in the same piping system shall be grouped together in the schedule. A sample of the valve numbering system to be used will be furnished by the Engineer. Valve numbers may include three or four numerals and a letter.

6. List of electrical relay settings and control and alarm contact settings.

Each copy of the manual shall be assembled in one or more binders, each with title page, typed table of contents, and heavy section dividers with copper reinforced holes and numbered plastic index tabs. Each manual shall be divided into sections headed by the equipment specification section included in "Workmanship and Materials." Binders shall be 3-ring hard-back. All data shall be punched for binding and composition and printing shall be arranged so that punching does not obliterate any data. The cover and binding edge of each manual shall have the project title, Division designation and manual title printed thereon, all as furnished and approved by the Engineer.

Where more than one binder is required, they shall be labeled Vol. 1, Vol. 2, and so on. The table of contents for the entire set, identified by volume number, shall appear in each binder.

The four (4) hardcopies of the manuals and data included therein shall be provided in conformance with the subsection headed "Working Drawings" and, in addition, to the requirements of the General Provisions. The costs of the Operation and Maintenance Manual shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

Submittals / Request for Information / Shop Drawings

Contractor shall prepare and submit up to four (4) hardcopies and one (1) bookmarked, unsecured electronic post document format (PDF) file for all Submittals, RFI, and Shop Drawings. The City will review the submittals and return one (1) hardcopy and PDF file of the marked up submittal to the contractor. The contractor shall have approved hard copies of all submittals at the job site. Each electronic submission must be in a high resolution color format and shall be original electronic documents from the manufacturer. Hardcopies shall be high quality printed in color. Scanned printouts or poor quality resolution PDF files will not be accepted.

Asset Tracking Form

The Asset Tracking Form (ATF) is a general spreadsheet that is intended to begin tracking assets and their respective preventative maintenance at an early stage in the project. An ATF shall be prepared and submitted by Contractor (in electronic format) during two phases of the project. The first phase ATF shall be submitted after procurement of each piece of equipment and will include general information and specifications on the equipment such as, but not limited to, model, voltage, amperage, horsepower, material, and preventative maintenance tasks. The second ATF submission shall accompany the final submission of the Operation and Maintenance Manuals. Information included during this submission will include specific information on the equipment such as, but not limited to, serial numbers, equipment number, location, runtime hours, etc.

The City of Tampa Wastewater personnel will provide a blank electronic copy of the ATF in Microsoft Office 2007. Any submission must be in the same format.

SP-76 Programmed Controls Equipment

Prior to acceptance of computers and programmable logic controllers, the Contractor shall meet the following requirements:

A full set of the original software media and licenses and documentation for all software items used on the equipment shall be provided to the City. All unique configuration files and databases shall be included in as-built documents and in disk format containing itemized filename lists and ASCII Source listings of each. All unique hardware, wiring schemes and dip switch settings, exact as-built program listings, and digital configurations shall be included in the as-built documents.

No aspect of programmed controls equipment shall have any security or access controls which are not totally in the control of the City. No programmed software self-destructs, of any type, shall be allowed. The software shall allow unlimited restorations and backups from any appropriate storage media, to all appropriate equipment.

No Software Restriction Plug-in Modules or Software Activation Keys shall be allowed in any system, unless spare modules and keys are on hand for immediate disaster recovery.

Any part, whether hardware, software, or logical for which spare parts are not readily available; whose function or programming is not fully explained in documentation; or which in any way is not able to be replaced, restored, reprogrammed, and immediately placed back into service by the City using the as-built data, program listings, software media, and other resources provided shall not be accepted by the City.

All security information and data, including security bypass procedures for all approved security features, shall be fully documented to the City prior to acceptance. All unique patch cords, cables, connectors, tools, and appurtenant programming devices necessary to restore and maintain programming shall be supplied for use by the City and demonstrated in the appropriate training sessions.

The training for all programmed controls equipment shall include instructions on operation and maintenance of hardware and software. The training shall also demonstrate the full backup and restoration of all software after total equipment failure utilizing reinstallation procedures that accommodate unique hardware requirements, unique configuration files and databases, unique dip switch settings, and unique wiring information. The appropriate City personnel shall be trained to bypass all approved security features of all such equipment. The backup and restoration training shall use the actual as-built information and all unique appurtenances and itemize all such documentation and appurtenances to show that these items are complete.

SP-77 Services of Manufacturers' Representatives

The services of manufacturers' representatives shall be provided on the site as required for the supervision of installation, the adjustment and placing in satisfactory trouble-free operation of such equipment, and instructing City personnel in the operation and maintenance of such equipment for which such specialized services are specified, directed, or required.

Such manufacturers' services shall be of sufficient time and include a minimum period of one 8-hour day for instruction of City personnel. Additional time shall be provided if necessary.

The cost of all services of manufacturers' representatives shall be included in the various Contract Unit Price Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SPECIFICATIONS

WORKMANSHIP AND MATERIALS

SECTION 1 - EXCAVATION - EARTH AND ROCK

W-1.01 General

Opencut excavations shall be made to the widths and depths necessary for constructing all structures, pipelines and other conduits included in the Contract, according to the Plans, and includes the excavation of any material which, in the opinion of the Engineer, is desirable to be excavated for any purpose pertinent to the construction of the work. Banks more than 5 feet high, where a danger of slides or cave-ins exist, shall be shored or sloped to the angle of repose.

Where excavations are to be made below groundwater, the Contractor shall submit to the Engineer for approval, in detail, his proposed method for control of groundwater, including a description of the equipment he plans to use and the arrangement of such equipment. No such excavation shall be started until approval of the Engineer has been obtained. Dewatering work shall be included in the Contract Items for pipelines, box culverts, inlets, manholes and other structures, and pumping stations, and no separate payment will be made therefor.

W-1.02 Clearing

The site of all opencut excavations shall first be cleared of obstructions preparatory to excavation. This includes the removal and disposal of vegetation, trees, stumps, roots and bushes, except as specified under the subsection headed "Trench Excavation."

W-1.03 Authorized Additional Excavation

In case the materials encountered at the elevations shown are not suitable, or in case it is found desirable or necessary to go to an additional depth, or to an additional depth and width, the excavation shall be carried to such additional depth and width as the Engineer may direct in writing. The Contractor shall refill such excavated space with either Class I concrete, or select sand or crushed stone fill material, as ordered. Where necessary, fill materials shall be compacted to avoid future settlement. Additional earth excavations so ordered and concrete, or selected sand or crushed stone fill material ordered for filling such additional excavation and compaction of select sand or crushed stone fill material will be paid for under the appropriate Contract Items or where no such items exist, as extra work as specified in Article 7 of the Agreement.

W-1.04 Unauthorized Excavation

Wherever the excavation is carried beyond or below the lines and grades shown or given by the Engineer, except as specified in the subsection headed "Authorized Additional Excavation," all such excavated space shall be refilled with such material and in such manner as may be directed in order to ensure the stability of the various structures. Spaces beneath all manholes, structures or pipelines excavated without authority shall be refilled by the Contractor at his own expense, with Class I concrete, or select sand or crushed stone fill material, and properly compacted, as ordered by the Engineer, and no separate payment will be made therefor.

W-1.05 Segregation and Disposal of Material

Topsoil suitable for final grading and landscaping and excavated material suitable for backfilling or embankments shall be stockpiled separately on the site in locations approved by the Engineer. Excavated and other material shall not be stored nearer than 4 feet from the edge of any excavation and shall be so stored and retained as to prevent its falling or sliding back into the excavation. Surplus excavated material and excavated material unsuitable for backfilling or embankments shall become the property of the Contractor and shall be transported, as approved by the Engineer, away from the site of the work to the Contractor's own place of disposal.

W-1.06 Shoring and Sheeting

All excavations shall be properly shored, sheeted, and braced or cut back at the proper slope to furnish safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, and to avoid delay to the work, all in compliance with the U. S. Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). The minimum shoring, sheeting and bracing for trench excavations shall meet the general trenching requirements of the safety and health regulations. Before starting excavation for jacking pits and structures, the Contractor shall submit complete design calculations and working drawings of proposed sheeting and bracing arrangements which have been prepared, signed and sealed by a Professional Engineer registered in the State of Florida. Bracing shall be so arranged as not to place any strain on portions of completed work until the general construction has proceeded far enough, in the opinion of the Engineer, to provide ample strength. If the Engineer is of the opinion that at any point the sheeting or supports furnished are inadequate or unsuited for the purpose, he may order additional sheeting or supports to be installed. Whether or not such orders are issued, the sole responsibility for the design, methods of installation, and adequacy of the sheeting and supports shall be and shall remain that of the Contractor.

Tight sheeting shall be used in that portion of the excavation in City collector and arterial streets and in State and County highways below the intersection of a 1 on 1 slope line from the edge of the existing pavement to the nearest face of the excavation.

In general, sheeting for pipelines shall not be driven below the elevation of the top of the pipe. If it is necessary to drive the sheeting below that elevation in order to obtain a dry trench or satisfactory working conditions, the sheeting shall be cut off at the top of the pipe and left in place below the top of the pipe at no additional cost.

The sheeting and bracing shall be removed as the excavation is refilled in such a manner as to avoid the caving in of the bank or disturbance to adjacent areas or structures except as otherwise shown or directed. Voids left by the withdrawal of the sheeting shall be carefully filled by ramming or otherwise as directed.

Permission of the Engineer shall be obtained before the removal of any shoring, sheeting, or bracing. Such permission by the Engineer shall not relieve the Contractor from the responsibility for injury or to other property or persons from failure to leave such sheeting and bracing in place.

W-1.07 Sheeting Left in Place

The Engineer may order, in writing, any or all sheeting or bracing to be left in place for the purpose of preventing injury to the structures or to other property or to persons, whether such sheeting or bracing was shown on the Plans or placed at his direction or otherwise. If left in place, such sheeting shall be cut off at the elevation ordered, but, in general, such cutoffs shall be at least 18 inches below the final ground surface. Bracing remaining in place shall be driven up tight.

The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders.

Sheeting and bracing left in place, by written order of the Engineer, will be paid for under the appropriate Contract Item if included in the Proposal or otherwise by provisions of extra work as specified in Section 7 of the Agreement.

W-1.08 Removal of Water

At all times during the excavation period and until completion and acceptance of the work at final inspection, ample means and equipment shall be provided with which to remove promptly and dispose of properly all water entering any excavation or other parts of the work. The excavation shall be kept dry. No water shall be allowed to rise over or come in contact with

masonry and concrete until the concrete and mortar have attained a set satisfactory to the Engineer and, in any event, not sooner than 12 hours after placing the masonry or concrete. Water pumped or drained from the work hereunder shall be disposed of in a safe and suitable manner without damage to adjacent property or streets or to other work under construction. Water shall not be discharged onto streets without adequate protection of the surface at the point of discharge. No water shall be discharged into sanitary sewers. No water containing settleable solids shall be discharged into storm sewers. Any and all damage caused by dewatering the work shall be promptly repaired by the Contractor.

W-1.09 Structure Excavation

Excavations shall be of sufficient size and only of sufficient size to permit the work to be economically and properly constructed in the manner and of the size specified. The bottom of the excavation in earth and rock shall have the shape and dimensions of the underside of the structure wherever the nature of the ground will permit.

W-1.10 Trench Excavation

Before starting trench excavation, all obstructions which are to be removed or relocated shall be cleared away. Trees, shrubs, poles, and other structures which are to be preserved shall be properly braced and protected. All trees and large shrubs shall be preserved with damage to the root structure held to a minimum, unless otherwise shown or specified. Small shrubs may be preserved or replaced with equivalent specimens.

The width of trenches shall be such as to provide adequate space for workmen to place, joint, and backfill the pipe properly, but shall be kept to a minimum. Unless otherwise approved by the Engineer, the clear width of the trench at the level of the top of the pipe shall not exceed the sum of the outside diameter of the pipe barrel plus 24 inches.

In sheeted trenches, the clear width of the trench at the level of the top of the pipe shall be measured to the inside of the sheeting.

Should the Contractor exceed the maximum trench widths specified above, without written approval of the Engineer, he may be required to provide, at his own expense, concrete cradle or encasement for the pipe as directed by the Engineer, and no separate payment will be made therefor.

The Contractor shall excavate trenches to the respective depths, below the bottom of the pipe, for the various classes of pipe bedding shown on the Plans so that pipe bedding material can be placed in the bottom of the trench and shaped to provide a continuous, firm bearing for the

pipe barrel and bells.

If unstable material is exposed at the level of the bottom of the trench excavation, it shall be excavated in accordance with the subsection headed "Authorized Additional Excavation." When in the judgement of the Engineer the unstable material extends to an excessive depth, he may advise the Contractor in writing to stabilize the trench bottom with a crushed stone, sand mat or gravel mat to ensure firm support for the pipe by other suitable methods. Payment for such trench stabilization will be made under the appropriate Contract Items or where no such items exist, as extra work as specified in Section 7 of the Agreement.

The open excavated trench preceding the pipe laying operation and the unfilled trench with pipe in place shall be kept to a minimum length causing the least disturbance to traffic and use of adjacent property. Ladders shall be provided and so located as to provide means of exit from the trench without more than 25 feet of lateral travel.

W-1.11 Rock Excavation

The term "rock" as used herein shall include all materials which have compressive strengths in excess of 300 psi in their natural undisturbed state and which, in the opinion of the Engineer, require drilling and blasting, wedging, sledging, barring or breaking with power tools not otherwise required for normal excavating.

Rock shall be excavated, within the boundary lines and grades as shown on the Plans, specified, or given by the Engineer. Rock removed from the excavation shall become the property of the Contractor and shall be removed by him away from the site of the work to his own place of disposal, and no separate payment will be made therefor.

All shattered rock and loose pieces shall be removed.

For trench excavation in which pipelines or other conduits are to be placed, the rock shall be excavated to a minimum depth of 6 inches below the bottom of the pipe and the excavated space refilled with pipe bedding material. Placing, compacting, and shaping pipe bedding material shall be included in the various classified unit price Contract Items for pipelines, and no separate payment will be made therefor.

For manhole excavation, the rock shall be excavated to a minimum depth of 8 inches below the bottom of the manhole base for pipelines 24 inches in diameter and larger, and 6 inches below the bottom manhole base for pipelines less than 24 inches in diameter and the excavated space refilled with crushed stone. Placing, compacting, and shaping crushed stone for manhole bases shall be included in the appropriate Contract Items for manhole bases, and no separate

payment will be made therefor.

For cast-in-place structures, the rock shall be excavated only to the bottom of the structure or foundation slab.

Excavated space in rock below structures, pipelines, and manholes which exceeds the depths specified above shall be refilled with Class I concrete, crushed stone, or other material as directed by the Engineer. Refilling of over-excavated rock in rock shall be included as part of the rock excavation, and no separate payment will be made therefor.

Where applicable, the requirements of the subsections on "Trench Excavation" and "Structure Excavation" shall be followed.

Blasting may be performed only when approved by the Engineer and authorized by the Agency having jurisdiction over the subject location and in accordance with all laws, ordinances, and regulations of the Agency.

SECTION 2 - BACKFILLING

W-2.01 General

All excavation shall be backfilled to the original surface of the ground or to such other grades as may be shown or directed. For areas to be covered by topsoil, backfill shall be left 4 inches below the finished grade or as shown on the Plans. The time elapsing before backfilling is begun shall be subject to the approval of the Engineer. In all backfilling, all compressible and destructible rubbish and refuse which might cause later settlement and all lumber and braces shall be removed from the excavated space before backfilling is started, except that sheeting and bracing shall be left in place or removed as the work progresses.

Construction equipment used to backfill against and over cast-in-place concrete structures shall not be permitted to travel over these structures until the designated concrete strength has been obtained as verified by concrete test cylinders. In special cases where conditions warrant, as determined by the Engineer, the above restriction may be modified if the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

W-2.02 Unsuitable Backfill Material

Before backfilling around structures, all rubbish shall be removed from behind the walls.

When the excavated material contains garbage, cinders, glass, tin cans, wood, or other trash or objectionable organic material, as determined by the Engineer, it shall not be used for backfill but shall be disposed of by the Contractor away from the site of the work to his own place of disposal. The unsuitable materials shall be replaced with backfill material which shall be sand, gravel, sandy loam, or other excavated material free of objectionable organic matter, as approved by the Engineer.

W-2.03 Select Fill Material - General

Select fill material shall be used for pipe bedding, manhole bedding, trench and structure backfill, and other purposes as shown on the Plans, specified, and ordered in writing by the Engineer.

Select fill material shall be sand, conforming to the requirements of the subsections headed "Select Fill Material - Sand" or crushed stone conforming to the requirements of the subsection headed "Select Fill Material - Crushed Stone."

W-2.04 Select Fill Material - Sand

Sand used for pipe bedding or as select fill material for trench or structure backfill shall consist of job excavated sand or imported sand which can be readily and thoroughly compacted.

Sand shall be reasonably well graded and shall fall within the following gradation limits:

Passing No. 4 sieve - 95 percent (minimum)
Passing No. 200 sieve - 10 percent (maximum)

Sand containing more than 10 percent of material passing the No. 200 sieve or sand which, in the opinion of the Engineer, would have a tendency to flow under pressure when wet will not be acceptable for use as pipe bedding or select fill material for trench or structure backfill

Sand shall not be used for bedding for manholes or other structures.

W-2.05 Select Fill Material - Crushed Stone

Crushed stone used for pipe bedding, manhole base bedding, or as select fill material for trench or structure backfill shall consist of clean, durable rock, angular in shape, which can be readily and thoroughly compacted. Crushed stone shall be reasonably well graded and shall be no greater than a No. 57 stone.

W-2.06 Pipe and Structure Bedding

All pipelines shall be bedded in well graded, compacted select fill material. Select fill material shall be sand, conforming to the subsection headed "Select Fill Material - Sand" and/or crushed stone, conforming to the subsection headed "Select Fill Material - Crushed Stone," as shown on the Plans, specified or ordered in writing by the Engineer. Pipe bedding shall be constructed in accordance with the details shown on the Plans.

When shown on the Plans or ordered in writing by the Engineer, pipelines (except PVC) shall be laid in Class 1 concrete cradle or encasement.

Precast concrete manhole bases shall be bedded on No. 57 stone, conforming to the subsection headed "Select Fill Material - Crushed Stone," as shown on the Plans.

Cast-in-place manhole bases and other foundations for structures shall be cast against undisturbed earth or compacted fill in clean and dry excavations.

Existing underground structures, tunnels, conduits and pipes crossing the excavation shall be bedded with compacted select fill material. Bedding material shall be placed under and around each existing underground structure, tunnel, conduit or pipe and shall extend underneath and on each side to a distance equal to the depth of the trench below the structure, tunnel, conduit or pipe.

W-2.07 Bedding Placement for Pipelines

Select fill material, used as pipe bedding, shall be placed by hand, in uniform layers not greater than 6 inches in loose thickness and thoroughly compacted in place. Select fill material pipe bedding shall extend up around the pipe to one foot over the top of the pipe.

Each layer of select fill shall be thoroughly tamped and compacted in place by hand or with suitable mechanical or pneumatic tools to a dry density not less than 95 percent of the maximum dry density as determined by AASHTO Des: T-180. No large stone fragments shall be placed in the pipe bedding nor closer than two feet to any point on any pipe.

W-2.08 Bedding Placement for Precast Concrete Manholes

No. 57 stone used for bedding beneath precast manhole bases shall be placed in uniform layers not greater than 6 inches in loose thickness and thoroughly compacted in place with suitable mechanical or pneumatic tools.

W-2.09 Structure Backfill

Backfill around manholes, risers, and structures shall be suitable job excavated material, selected fill material, or other material approved by the Engineer. Such backfill shall extend from the bottom of the excavation or top of structure bedding to the bottom of pavement base course, subgrade for lawn replacement, the top of the existing ground surface, or to such other grades as may be shown or given by the Engineer.

The backfill shall be placed in uniform layers not greater than 12 inches in loose thickness and thoroughly compacted in place with suitable mechanical or pneumatic tools to a dry density of not less than 98 percent of the maximum dry density as determined by AASHTO Des: T-180.

W-2.10 Trench Backfill

Trenches shall be backfilled from 1 foot over the top of the pipe to the bottom of pavement base course, subgrade for lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or given by the Engineer. Trench backfill shall be select fill material, suitable job excavated material or other material, as approved by the Engineer.

Except under pavements and railroad tracks, trench backfill shall be placed in uniform layers not greater than 18 inches in loose thickness and thoroughly compacted in place using heavy-duty tampers such as pneumatic jackhammers with tamping foot attachment or vibrating rollers if required. Each layer shall be compacted to a dry density of not less than 95 percent of the maximum dry density as determined by AASHTO Des: T-180.

Where railroad tracks or pavements and appurtenances for streets or highways are to be placed over trenches, the trench backfill shall be placed in uniform layers not greater than 12 inches in loose thickness and thoroughly compacted in place with equipment as specified above. Each layer shall be compacted to a dry density of not less than 98 percent of the maximum dry density as determined by AASHTO Des: T-180. On City of Tampa streets, each layer shall be compacted as specified above to the bottom of the subbase which is defined as 10 inches below the bottom of the base course. The subbase shall be compacted to 98 percent of modified proctor.

Trench backfilling work shall be done in a manner to prevent dropping of material directly on top of any conduit or pipe through any great vertical distance. In no case shall backfilling material from a bucket be allowed to fall directly on a structure or pipe and in all cases, the bucket shall be lowered so that the shock of falling earth will not cause damage.

Lumps shall be broken up and if there are any stones, pieces of crushed rock or lumps which cannot be readily broken up, they shall be distributed throughout the mass so that all interstices are solidly filled with fine material.

W-2.11 Backfill for Short Tunnel

Where pipelines are placed in short tunnels, the annular space between the outside of the pipe wall and the tunnel wall shall be completely filled with select fill material or suitable excavated material. Pipelines in short tunnels shall be suitably supported, to permit placing backfill which shall be suitably tamped in place.

W-2.12 Finish Grading

Finish grading shall be performed to meet the existing contour elevations and grades shown on the Plans or given by the Engineer and shall be made to blend into adjacent natural ground surfaces. All finished surfaces shall be left smooth and free to drain.

Grading outside of pipelines or structure lines shall be performed in such a manner as to prevent accumulation of water within the area. Where necessary or where shown on the Drawings, finish grading shall be extended to ensure that water will be carried to drainage ditches, and the construction area left smooth and free from depressions holding water.

W-2.13 Responsibility for After Settlement

Any depression which may develop in backfilled areas from settlement within one year after the work is fully completed and accepted shall be the responsibility of the Contractor. The Contractor shall, at his own expense, provide as needed additional backfill material, pavement base replacement, permanent pavement sidewalk curb and driveway repair or replacement, and lawn replacement and shall perform the necessary reconditioning and restoration work to bring such depressed areas to proper grade as approved by the Engineer.

W-2.14 Inspection and Testing of Backfilling

All backfill shall be subject to test by the Engineer with the assistance of the Contractor.

SECTION 4 - CONCRETE MATERIALS

W-4.01 General

The materials covered under this section are cement, sand, crushed stone, gravel, and water for use in concrete, grout, and mortar.

W-4.02 Cement

Cement shall be from a source approved by the Engineer before the cement is ordered. Domestic manufacturers of cement shall furnish to the Engineer notarized Certificates of Manufacture as evidence that the cement conforms to the requirements of the Specifications. These certificates shall include mill test reports on the cement. Suppliers of foreign cements shall furnish to the Engineer test data from a testing laboratory approved by the Engineer to show conformance with all applicable requirements of ASTM C150/C150M "Standard Specification for Portland Cement." Samples for testing shall be taken in accordance with ASTM C183 "Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement." Cement shall be either air-entraining portland cement or standard portland cement, except as otherwise specified. If standard portland cement is used, an air-entraining agent meeting the requirements of ASTM C260 "Standard Specification for Air-Entraining Admixtures for Concrete" shall be added to the concrete at the time of mixing in an amount sufficient to produce from 4 to 6 percent entrained air in the concrete for plastic mixes having a slump of 2 to 4 inches. Standard portland cement shall meet the requirements of ASTM C150/C150M, Type I or Type II, and air-entraining cement shall meet the requirements of ASTM C150/C150M, Type IA or Type IIA.

W-4.03 High-Early Strength Cement

In case high-early strength cement is used in any special part of the work, it shall be true portland cement with no chemicals or other substances added to expedite hardening and shall be of a brand approved by the Engineer. The cement shall meet the requirements of ASTM C150/C150M Type III or Type IIIa. High-early strength cement shall be used only with the approval of the Engineer.

W-4.04 Fine Aggregate

Fine aggregate shall be natural sand, washed clean, having hard, strong, sharp, durable, uncoated grains; and shall be free from injurious amounts of dust, lumps, soft or flaky particles, mica, shale, alkali, organic matter, loam, or other deleterious substances. Fine aggregate shall conform to the requirements of Section 902 Fine Aggregate) of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, current edition in force.

W-4.05 Coarse Aggregate

Coarse aggregate shall consist of gravel or broken stone composed of strong, hard, durable, uncoated pebbles or rock fragments, washed clean and free from injurious amounts of shale, coal, clay, lumps, soft fragments, dirt, glass, and organic and other deleterious substances. It shall conform to ASTM C33/C33M "Standard Specification for Concrete Aggregates." The size shall be No. 57, as specified in Table II of ASTM C33/C33M.

W-4.06 Admixtures

The use of admixtures will be permitted but must be approved by the Engineer. Set retarders shall be "MasterSet R 100" as manufactured by Master Builders Solutions or " Sika Plastiment" as manufactured by Sika Corporation, or equal. Retarding admixtures shall be used in strict accordance with the manufacturer's directions and the manufacturer shall make available, at no cost upon 72 hours notification, the services of a qualified full time field representative to assure proper use of the admixture.

Set retarding admixtures shall be used only with the approval of the Engineer. The amount of set retarder added shall be sufficient to keep the concrete workable during the period of placement and finishing.

W-4.07 Water

Water used in mixing concrete shall be clean and shall not contain deleterious amounts of acids, alkalies, or organic materials. All water shall be furnished from sources approved by the Engineer.

W-4.08 Fly Ash

Fly ash shall be a local product with cementitious properties, conforming to the requirements of ASTM C618 "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete," Class C or F, with the following exceptions:

Loss on Ignition	-	5%
Maximum Sulfur Trioxide	-	4%

Fly ash shall have a uniform light color and shall be from a source approved by the Engineer.

Fly ash shall be stored at the concrete mixing plant separate from the cement, in accordance with the requirements specified for storage of cement. Cement and fly ash shall not be intermixed prior to being added to the concrete mix.

SECTION 5 - CONCRETE

W-5.01 General

Concrete shall be divided into various grades, classified according to compressive strength, to be used in the respective places shown on the Plans, called for in the Specifications, or ordered by the Engineer. The classes of concrete mixtures are referred to as Class A, Class B, and Class D.

Class A concrete is intended principally for precast concrete units.

Class B concrete is intended principally for reinforced concrete structures, and shall be used for columns, walls, beams, slabs, equipment pads, and the like.

Class D concrete is intended principally for low strength concrete, plain or reinforced, used for soil stabilization, filling, and other similar purposes. For large volume, boulders or fragments of rock excavated during construction may be embedded in the concrete to provide added bulk. Care shall be taken in placing the boulders or rock fragments, so that there are no voids in the concrete.

W-5.02 Strength and Proportion

Concrete mixes shall be designed and proportioned to provide the following minimum compressive strengths and the proper workability without exceeding the stipulated maximum quantities of mixing water:

Class	Compressive Strength - psi 7-day Test	28-day Test	Maximum Water Gallons Per Sack
A	3,400	5,000	3-1/2
B	2,700	4,000	5-1/2
D	1,300	2,000	7-1/4

Concrete, except Class D, shall contain not less than 564 pounds (six standard 94-pound bags) of cement per cubic yard.

W-5.03 Moisture Content of Aggregates

The quantity of free water contained in the aggregate shall be determined from time to time as required by the Engineer, and this quantity shall be deducted from the water added at the mixer, but no change shall be made in the water-cement ratio.

The quantity of water used in each batch shall be the total quantity, including the free moisture contained in the aggregate.

W-5.04 Consistency

Proportions of ingredients shall be varied to secure the desired concrete consistencies when tested in accordance with ASTM C143/C143M "Standard Test Method for Slump of Hydraulic-Cement Concrete," conforming to the following slump requirements:

Concrete Placement	Minimum and Maximum Slump in Inches	
	Class A & B	Class D
Normal	3 to 4	3 to 5
Pumped	4 to 6	4 to 6

In all cases, the proportions of aggregates for concrete shall be such as to produce mixtures which will work readily into the corners and angles of the forms and around reinforcement, without permitting the segregation of materials or the collection of free water on

the surface. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve shall not be less than 30 percent, nor greater than 45 percent of the total, unless otherwise required by the Engineer.

W-5.05 Field Tests

During the progress of the work, a reasonable number of test cylinders shall be made, cured, and stored in accordance with ASTM C31/C31M "Standard Practice for Making and Curing Concrete Test Specimens in the Field" and shall be tested in accordance with ASTM C39/C39M "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens," Each test shall consist of three cylinders, one laboratory control cylinder to be tested at 7 days, and one field control cylinder to be tested at 28 days. If the 7-day cylinder is not satisfactory, the third cylinder, a laboratory control cylinder, will be tested at 7 days. Otherwise, the third cylinder will be tested at 28 days.

The Contractor shall furnish necessary labor and materials and shall assist the Engineer, if required, in making concrete test cylinders.

The average strength of all the cylinders shall be equal to or greater than the strengths specified, and at least 90 percent of all the tests shall indicate a strength equal to or greater than the strength specified. In cases where the strength of the test cylinders for any portion of the structure falls below the requirements specified herein, the Engineer may order a change in the mix or water content for the remaining portion of the work, and may require the Contractor to secure test specimens of the hardened concrete represented by these cylinders. The number of test specimens required to be taken shall be the same as the number of test cylinders made for each concrete placement. Specimens shall be secured and tested in accordance with ASTM C42/C42M "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete." If the specimen tests further substantiate that the concrete represented by the cylinders and specimens is below the strength requirements specified herein, the Engineer may require such concrete removed and rebuilt.

W-5.06 Ready-Mixed Concrete

Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in ASTM C94/C94M "Standard Specification for Ready-Mixed Concrete," and subject to all provisions herein relative to materials, strength, proportioning, consistency, measurement,

and mixing.

The rate of delivery of the mixed concrete shall be such that the interval between placing of successive batches shall not exceed 45 minutes. The elapsed time between the introduction of mixing water to the cement and aggregates and depositing concrete in the work shall not exceed 45 minutes including mixing and agitating time.

W-5.07 Forms - General

Forms shall conform to shape, lines, and dimensions of the member as shown on the Plans. They shall be substantial, properly braced, and tied together so as to maintain position and shape and to resist all pressures to which they may be subjected. Forms shall be sufficiently tight to prevent leakage of mortar. The size and spacing of studs and wales shall be determined by the nature of the work and the height to which concrete is placed. In all cases, wales shall be doubled, and the size of studs and wales used shall not be less than 2 by 6 inches. Joints shall be snug and shall occur at the designated locations only. Horizontal joints shall be level and vertical joints plumb.

The entire inside surfaces of forms shall be oiled with an approved form oil or shall be thoroughly wetted just prior to placing concrete.

W-5.08 Placing Concrete

Concrete shall be placed only in forms which have been approved by the Engineer and in his presence. Where the procedure is not specifically described herein, the placing of concrete shall be in accordance with the recommendations of ACI Standard 304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete."

After mixing, concrete shall be transported rapidly to the place of deposit. Concreting operations shall be continuous until the section, panel, or scheduled placement is completed.

Concrete may be conveyed in buckets, buggies, chutes, or other approved means. Apparatus used for conveying concrete shall be flushed thoroughly with water before and after each run. The point of delivery of concrete shall be as close to the work as possible and in no case more than 5 feet from the point of final deposit in the horizontal direction. Re-handling of concrete will not be permitted.

Concrete shall be deposited level in layers not to exceed 18 inches in a manner to prevent segregation of the ingredients.

Wall concrete shall be deposited through heavy duck canvas or galvanized iron chutes equipped with suitable hopper heads. Chutes shall be of variable lengths, so that the free fall of concrete shall not exceed 3 feet.

Freshly laid exposed concrete shall be protected in an approved manner against damage from the elements and unavoidable construction operations.

Special care shall be taken to place the concrete against the forms, particularly in angles and corners, in order to prevent voids, pockets, and rough areas. The concrete shall be rodded and spaded in a manner to work the coarse aggregate away from the forms, whether vibrators are used or not. Every precaution shall be taken to make all concrete masonry solid, compact, watertight, and smooth.

W-5.09 Cold Weather Requirements

When the atmospheric temperature at the work is 40 degrees F or below, or when the U.S. Weather Bureau forecasts such temperatures within 24 hours, the freshly placed concrete shall be protected against freezing.

W-5.10 Hot Weather Requirements

For placement of concrete in hot weather, the recommendations of ACI Standard 305 “Guide to Hot Weather Concreting.”

W-5.11 Curing

Standard portland cement concrete surfaces normally exposed to the atmosphere shall be protected against excessively rapid drying by curing a minimum period of seven days. When average daily temperatures are above 70 degrees F, similarly, exposed high-early strength concrete surfaces shall be cured for a minimum period of three days. When daily average temperatures are below 70 degrees F, the curing period for all concrete shall be extended as directed by the Engineer. The curing period shall commence immediately following the placing of the concrete. Curing shall be accomplished by a method approved by the Engineer. Should there be any delay in the application of the method of curing used, the concrete shall be covered with moistened burlap or kept wet by sprinkling.

W-5.12 Grout and Mortar

Grout for grouting around tunnel linings and for other locations as specified or directed shall be mixed in the proportions of one (1) part portland cement to one (1) part of sand by volume.

Non-shrink grout shall be a pre-blended mixture of a non-shrinking agent and shall be "SikaGrout - 885 MF" as manufactured by Sika Corporation, "Hi-Flow Metallic Grout" as manufactured by Euclid Chemical Company, or equal.

Lean grout for backfilling the space surrounding the sewer sections in tunnels or other areas as specified or directed shall be mixed in the proportion of one (1) part portland cement to twelve (12) parts of sand, by volume.

Mortar for brick or concrete block masonry shall be composed of one (1) part Type IIA portland cement to one (1) part of sand, by volume. Sufficient water shall be added to give the proper consistency. The mixture shall be thoroughly worked to produce a uniform mortar with all particles of aggregate well coated.

W-5.13 Water Stops

Water stops shall be installed in construction joints as shown on the Plans or specified. Water stops shall be made of extruded polyvinyl chloride. Reclaimed plastic material shall not be used in the manufacture of the water stops.

The water stop shall be 4 inches wide and not less than 1/8 inch thick at the narrowest point and 3/8-inch thick immediately adjacent to the center of the water stop. The water stop shall have longitudinal ribs with a hollow bulb center pleat. Water stops shall have a Shore A durometer hardness between 65 and 75, a finished tensile strength of not less than 2,000 psi, and a specific gravity of not more than 1.38.

. Plastic water stops shall meet the requirements of the Corps of Engineer Specification CRD-C572 "Corp of Engineers Specifications for Polyvinylchloride Waterstops," except as modified herein. Water stops shall be "Greenstreak PVC Waterstop" as manufactured by Sika Corporation or equal.

Field splices for water stops shall be made by heat fusion using a field splicing unit. Each water stop type shall have its own splice mold built to the size and shape of the water stop to be spliced. Splicing mold and materials, including splicing cement, solvent, splicing stock, and other items, shall be as furnished by the manufacturer of the water stop. Field splicing shall be performed in strict accordance with the manufacturer's directions and to cause as little damage as possible to the continuity of the ribbed strips, all to the satisfaction of the Engineer.

SECTION 6 - REINFORCING STEEL

W-6.01 Standards

Reinforcing steel bars for concrete reinforcement shall be deformed bars meeting the requirements of ASTM A615/A615M "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement," Grade 60, unless shown or specified otherwise. They shall be free from defects, kinks, and from bends that cannot be readily and fully straightened in the field. Test certificates of the chemical and physical properties covering each shipment shall be submitted for approval.

Reinforcing mesh shall be of the electrically welded type, with wires arranged in rectangular patterns, of the sizes shown or specified and shall meet the requirements of ASTM A1064/A1064M "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete."

W-6.02 General

Reinforcing steel bars shall be supplied in lengths which will allow them to be conveniently placed in the work and provide sufficient lap at joints. Dowels of proper lengths, size, and shape shall be provided for tying walls, beams, floors, and the like together when shown, specified, or ordered.

Stirrups and ties shall have a minimum inside radius of bend of 2-1/2 bar diameters. All other bars No. 7 and smaller shall have a minimum inside radius of bend of 3 bar diameters, and No. 8 bars and larger shall have a minimum inside radius of bend of 4 bar diameters.

Splices in all reinforcements shall be lapped as specified hereinafter in "Table 1 - Grade 60 Reinforcing Bar Splice Lapping Lengths" unless shown or specified otherwise. All splices shall be staggered, unless otherwise approved by the Engineer.

TABLE 1 - GRADE 60
REINFORCING BAR SPLICE LAPPING LENGTHS

Bar Size	#3	#4	#5	#6	#7	#8	#9	#10	#11
Top Bars - ACI Class B	13	17	22	28	38	50	64	81	100

Top Bars - ACI									
Class C	17	23	29	37	50	66	83	106	130
Other Bars - ACI									
Class B	12	12	16	20	27	36	46	58	71
Other Bars - ACI									
Class C	12	16	20	26	36	47	60	75	93

Notes:

1. Splice length given in inches.

2. Top bars are all horizontal reinforcement so placed that more than 12 inches of concrete is cast in the member below the bar. This includes horizontal wall reinforcement.

3. Where lapping bars of different sizes, use lap required for larger bar.

4. For all bars spaced closer than 6 inches, increase lap length 25 percent.

5. Unless otherwise specified, the length of lap for splices shall be as shown for ACI Class B where no more than 50 percent of the bars are lap spliced, and as shown for ACI Class C where more than 50 percent of the bars are lap spliced.

W-6.03 Detailing

The Contractor shall submit detailed placing drawings and bar listed to the Engineer for approval in accordance with the requirements for "Working Drawings" of the General Provisions, except as otherwise specified herein.

All provisions of the latest ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures" shall be followed in the preparation of placing drawings and bar lists.

Wall and slab reinforcing shall not be billed in sections. Complete elevations of all walls and complete plans of all slabs must be shown, except that when more than one wall or slab are identical only one such elevation or plan will be required. These plans or elevations need not be true views of the walls or slabs shown. Every reinforcing bar in a slab or a wall shall be billed on either a plan

or an elevation. Where necessary, sections shall be taken to clarify the arrangement of the steel reinforcement. All bars shall be identified on such sections, but in no case shall bars be billed on such sections.

For all reinforcing bars, unless the location of a bar is perfectly obvious, the location of such bar or bars shall be given by a dimension to some structural feature which must be readily distinguishable at the time bars are placed.

The set of placing drawings shall be complete in and by themselves to the extent that the bar setters will have no occasion to refer to the design drawings.

Before submittal to the Engineer, every placing drawing and bar list shall be completely checked including the quantity, size, type, length, bend dimensions, and type of support for all bars or mesh, and all other information on the drawing and list. The checking shall be done by a qualified person and all necessary corrections made.

If after placing drawings and bar lists have been submitted to the Engineer for approval, a partial or spot check by the Engineer reveals that the placing drawings obviously have not been checked by a qualified person, they will be returned to the Contractor for such a check and corrections, after which they shall be resubmitted for approval by the Engineer.

W-6.04 Delivery

Reinforcing steel shall be delivered to the work in bundles strongly tied, and each group of both bent and straight bars shall be identified with a metal tag giving the identifying number corresponding to the shop drawings and bar schedules. All bars shall be properly stored in an orderly manner, at least 12 inches off the ground and kept clean and protected from the weather, as directed by the Engineer, after delivery at the site of the work.

W-6.05 Protection

Reinforcing steel shall be delivered without rust other than that which may have accumulated during transportation to the work. It shall at all times be fully protected from moisture, grease, dirt, mortar, and concrete. Before being placed in position, it shall be thoroughly cleaned of all loose mill scale and rust and of any dirt, coatings, or other material that might reduce the bond.

If there is a delay in depositing concrete, the steel shall be inspected and satisfactorily cleaned immediately before the concrete is placed.

W-6.06 Fabrication and Installation - Bars

Bars shall be cut to required length and accurately bent before placing. Bars shall be bent in the shop unless written approval of field bending is obtained from the Engineer. If field bending is permitted, it shall be done only when the air temperature where the bending operation is performed is above 30 degrees F.

The bars shall be placed in the exact positions shown with the required spacing and shall be securely fastened in position at intersections to prevent displacement during the placing of the concrete. The bars shall be fastened with annealed wire of not less than 18 gauge or other approved devices. Spacing chairs of a type approved by the Engineer shall be furnished and properly placed to support and hold reinforcing bars in position in all beams and slabs, including slabs placed directly on the subgrade. Chairs which rest on the forms for slabs, the underside of which will be exposed to view in the finished work, shall have those portions galvanized or plastic coated which come in contact with the forms.

Splices in all reinforcement shall be lapped as specified in "Table 1 - Grade 60 Reinforcing Bar Splice Lapping Lengths" in the subsection headed "General." Splices at points of maximum tensile stress shall be avoided wherever possible. Temperature bars shall have a minimum clear spacing of 2-1/2 diameters. All bar splices shall be staggered where possible.

All welded splices shall be full penetration, butt welds, made by certified welders in accordance with ANSI/AWS D4.1/D4.1M “Structural Welding Code - Reinforcing Steel” Thermite welding or Cadweld type couplers may be used where approved by the Engineer.

On any section of the work where horizontal bars run further than the length of the forms, the form or head against which the work ends shall be perforated at the proper places to allow the bars to project through a distance at least equal to the lap specified. The projecting ends, however, unless otherwise directed by the Engineer, shall be of different lengths so that in no place will laps in adjoining bars in the same place occur opposite each other.

W-6.07 Installation - Mesh

Reinforcing mesh shall be placed in the positions shown, specified, or required to fit the work. Suitable spacing chairs or supports as specified for bars shall be furnished and placed to

maintain the mesh in correct location. Where a flat surface of mesh is required, the mesh shall be rolled or otherwise straightened to make a perfectly flat surface before placing. The length of laps not indicated shall be approved by the Engineer.

W-6.08 Concrete Protection for Reinforcing Steel

Reinforcing steel shall be placed and held in position so that the concrete cover, as measured from the surface of the bar to the surface of the concrete, shall be not less than the following, except as otherwise shown, specified, or directed:

1. General

   a. Concrete deposited directly against soil - 3 inches.
   b. Concrete in contact with soil or exposed to weather or sewage - 2 inches

2. Slabs (See Item 6)

   a. Top all surfaces - 2 inches

3. Beams - Girders - Columns (See Item 6)

   a. To main reinforcement - 2 inches
   b. To ties - 1-1/2 inches

4. Walls (See Item 6)

   a. 12 inches or more thick - 2 inches
   b. Less than 12 inches thick:
      (1) #6 bars or larger - 2 inches
      (2) #5 bars or smaller - 1-1/2 inches

5. Footings and Base Slabs

a.	Top face	- 3 inches
b.	Sides and ends	- 3 inches
c.	Bottom, Concrete deposited directly against ground	- 3 inches
	Concrete deposited directly against lean concrete work mat	- 2 inches

6. Add 1/2 inch for surfaces contacting or exposed to water or sewage.

7. Laps - as specified in "Table 1 - Grade 60 Reinforcing Bar Splice Lapping Lengths" in the subsection headed "General."

8. Spacing - clear distance between parallel bars - 2 inches minimum.

SECTION 7 - CONSTRUCTION AND EXPANSION JOINTS FOR CONCRETE

W-7.01 General

Construction and expansion joints shall be placed at all locations shown. No additions, deletions, or changes in location of construction and expansion joints shall be made without the written approval of the Engineer. Construction joints shall include a formed key and shall include a water stop where shown. Expansion joints shall include a joint filler between concrete faces, and shall include a water stop, and sealant with back-up rod where shown.

Water stops in the walls shall be carried into lower slabs and shall join the water stops in the slabs. All water stops shall be continuous. Water stops shall be set accurately to the position and line shown. Edges shall be held and securely fixed in position at intervals of not more than 24 inches so that they will not move during the placing of the concrete. No nails shall be driven through the water stops.

The Contractor shall submit samples and specifications of the materials he proposes to use.

All materials shall be installed or applied in accordance with the manufacturer's recommendations, unless otherwise specified herein.

W-7.02 Water Stops

Water stops shall be made of extruded polyvinyl chloride. No reclaimed plastic material shall be used in the manufacture of the water stops. Plastic water stops shall meet the requirements of the Corps of Engineer Specification CRD-C572 “Corps of Engineers Specifications for Polyvinylchloride Waterstops,” except as modified herein. The Shore A/10 durometer hardness shall be between 73 and 79, the tensile strength not less than 1,850 psi, and the specific gravity not more than 1.38. Water stops shall be “Greenstreak PVC Waterstop” as manufactured by Sika Corporation or equal.

Unless otherwise shown, water stops for construction joints shall be flat, at least 6 inches wide, and not less than 3/8 inch thick at the thinnest section. The water stop shall have ribbed longitudinal strips.

Unless otherwise shown, water stops for expansion joints shall be at least 9 inches wide and not less than 1/4 inch thick at the narrowest point and not less than 3/8 inch thick immediately adjacent to the center of the water stop. The water stop shall have ribbed longitudinal strips with a 3/4-inch inside diameter hollow bulb center. The water stop shall permit a joint movement of 1/4 inch under a tensile force of not more than 500 pounds per lineal inch.

Corners and intersections for all water stops shall be prefabricated so that only butt joints need be made in the field. Field fabrication of corners and intersections requires approval of the Engineer. Corners and intersections shall be mitered and assembled with approved equipment, as described for field joints.

Field joints shall be made by cutting the ends of the sections to be spliced so they will form a smooth even butt joint. The cut ends shall be heated with the splicing tool until the plastic melts. The two ends shall be pressed together until the plastic cools. Splicing shall cause as little damage to the continuity of the ribbed strips as possible.

W-7.03 Joint Filler for Expansion Joints

Joint filler shall be used for all expansion joints. Joint filler shall be closed cell polyethylene "DECK-O-FOAM" as manufactured by W. R. Meadows, "HBR" as manufactured by Nomanco, or equal, of the thickness shown.

Joint filler shall be placed against the completed portion of the work before the concrete for the next section is placed. The filler shall be fastened to the hardened concrete with a compatible adhesive in accordance with manufacturer's instructions. The filler shall extend through the thickness of the wall or slab and shall be flush with the finished surface, except where a joint sealant is shown. In joints having a water stop, the filler shall be fitted accurately on each side of the water stop to prevent the intrusion of concrete.

W-7.04 Joint Sealant

Expansion joints shall be finished with a joint sealant where shown or specified.

Joint sealant materials may be either a single-component urethane compound meeting the

requirements of Fed. Spec. TT-S-00230C and ASTM C920 "Standard Specification for Elastomeric Joint Sealants", or a two-component urethane compound meeting the requirements of Fed. Spec. TT-S-00227E and ASTM C920, except as modified herein.

Single-component urethane sealants shall be "Sikaflex-1A" as manufactured by Sika Corporation, "Dymonic 100" as manufactured by Tremco Sealants, or equal.

Two-component urethane sealants shall be "Sikaflex-2c NS" as manufactured by Sika Corporation, "Dymonic 240 FC" as manufactured by Tremco Sealants, or equal.

The urethane sealant shall be 100 percent polymer, nonextended, containing no solvent, lime, or coal tar. Color shall be as selected by the Engineer, but shall not be black. Sealant properties shall conform to the following table:

Property	Value	Test Method
Maximum final cure (days)	3	
Tensile strength (psi)	250-400	ASTM D412
Minimum elongation (%)	400	ASTM D412
Modulus at 100% elongation (psi)	40-60	Fed Spec.
Shore A hardness	30-40	Shore Durometer
Solid content (%)	98-100	
Peel strength (lb/in.)	50-60	Fed. Spec.
Minimum recovery (%)	75-85	Fed. Spec.
Initial tack-free cure (hrs.)	24-48	Fed. Spec.

ASTM D412: Standard Test Method for Vulcanized and Thermoplastic Elastomers - Tension.

The two-component sealant shall be mixed using a slotted paddle and slow speed mixer for

5 to 8 minutes, continually working paddle from top to bottom until sealant color is uniform. The side of the container and paddle blade shall be scraped down several times during the mixing operation to ensure uniform mixing.

Joint surfaces shall be properly prepared by removing all foreign matter and concrete laitance so that concrete surfaces are structurally sound, clean, dry, and free of all oil, grease, wax, waterproofing compounds, or form release materials prior to the application of primer and sealant. All concrete joint surfaces and all surfaces exposed to water shall be primed prior to sealing, with no exceptions. Priming of other surfaces shall be as recommended by the manufacturer of the sealant. The primer shall be as recommended by the manufacturer of the sealant, subject to the approval of the Engineer. Primer shall be applied by either brushing or spraying on the joint surfaces. Sealant shall be installed within 2 to 24 hours after the application of primer.

For horizontal joints, sealant may be installed by pouring directly from a suitable shaped can or by flowing from a bulk-loading gun. Vertical joints shall be filled from a gun, starting from the bottom, to avoid bridging and the formation of air voids. Overhead joints shall be filled from a gun, by laying a bead along each side of the joint and then filling the middle. Immediately after installation, sealant shall be tooled in order to establish firm contact with joint surfaces and to provide a smooth sealant surface. Method of tooling shall be in accordance with manufacturer's instructions.

Joint depth shall be controlled with the use of joint fillers and backup materials. Fillers and backup materials in contact with sealant shall be non-impregnated and free from asphalt, creosote, oil, or extractable plasticizers. Backup material shall be closed cell polyethylene foam rod, such as “Sealtight Backer Rod” as manufactured by W. R. Meadows, “Sika Backer Rod” as manufactured by Sika Corporation, or equal, with a diameter 1/4 inch larger than the joint width. Joint widths and sealant depths shall be as shown, except that sealant depth shall not exceed 1/2 inch.

W-7.05 Unbonded Horizontal Joints

Unbonded horizontal joints shall be used as shown or required where slabs or beams must be prevented from bonding to footings, walls, columns, or other rigid parts of the structure.

Bonding shall be prevented by use of structural grade neoprene pads meeting the requirements of Section 25, Division 2 of the AASHTO Standard Specifications for Highway Bridges.

The pads shall be placed over the bearing surface of the footing, wall, or other supporting part of the structure so as to isolate it from the new concrete being placed. The neoprene pads shall not be thinner than 1/4 inch.

SECTION 8 - METAL CASTINGS

W-8.01 General

Metal castings include all miscellaneous ferrous and nonferrous castings.

Wheel guards, valve boxes, manhole frames and covers, stop log grooves, brackets and supports for piping, gutter inlets, floor, roof and gallery drains, stormwater inlets, beehive grates and frames, cleanout covers, and special malleable iron castings and inserts are included in this classification.

W-8.02 Materials

Metal castings shall meet the requirements of the following standards, except as otherwise specified herein.

Gray Iron	ASTM A48/A48M
Malleable Iron	ASTM A47/A47M
Carbon Steel	ASTM A27/A27M
Alloy Steel	ASTM A148/A148M
Aluminum	ASTM B26/B26M
Aluminum Bronze	ASTM B148
Silicon Bronze	Navy Spec. 46B28
Manganese Bronze	ASTM B584
Ductile Iron	ASTM A536

ASTM A48/A48M: Standard Specification for Gray Iron Castings.
ASTM A47/A47M: Standard Specification for Ferritic Malleable Iron Castings.
ASTM A27/A27M: Standard Specification for Steel Castings, Carbon, for General Applications.
ASTM A148/A148M: Standard Specification for Steel Castings, High Strength, for Structural Purposes.
ASTM B26/B26M: Standard Specification for Aluminum-Alloy Sand Castings.
ASTM B148: Standard Specification for Aluminum-Bronze Sand Castings.
Navy Spec. 46B28: Silicone Bronze Castings.
ASTM B584: Standard Specification for Copper Alloy Sand Castings for General Applications.
ASTM A536: Standard Specification for Ductile Iron Castings.

W-8.03 Workmanship

Castings shall be made accurately to approved dimensions and shall be planed or ground where marked or where otherwise necessary to secure perfectly flat and true surfaces. Allowance shall be made in the patterns so that the specified thickness shall not be reduced. Manhole and cleanout frames and covers shall conform to the details shown on the Plans and shall be true and shall seat at all points. No plugging of defective castings will be permitted. All castings shall be erected to accurate grades and alignment, and when placed in concrete, they shall be carefully supported to prevent movement during concreting.

W-8.04 Weights

No castings weighing less than 95 percent of the theoretical weight, based on required dimensions, will be accepted. The Contractor shall provide facilities for weighing castings in the presence of the Engineer, or shall furnish invoices showing true weights, certified by the supplier.

SECTION 10 - DUCTILE IRON PIPE AND FITTINGS

W-10.01 General

All ductile iron pipe shall meet the requirements of AWWA C151. The type and configuration of pipe bedding for buried pipe shall be as shown on the Plans. Coatings and linings for ductile iron pipe and fittings shall conform to the subsection headed "Coatings and Linings," contained herein. Pipe joints shall be bell and spigot, flanged, or mechanical joint as shown on the Plans.

Ductile iron pipe and ductile iron fittings buried in the ground for force mains or installed in pumping stations shall have a minimum thickness of Class 52 unless specified otherwise as shown on the Plans.

W-10.02 Flanged Pipe

Flanged pipe shall conform to the requirements of AWWA C115. Flanges shall be ductile iron and shall have long hubs. There shall be no leakage through the pipe threads, and the flanges shall be designed to prevent corrosion of the threads from outside.

W-10.03 Fittings

All ductile iron fittings shall meet the requirements of AWWA C153, and have a pressure rating of 250 psi, or as specified, whichever is larger.

W-10.04 Flanged Joints

Flanged joints shall meet the requirements of ANSI Specification B16.1. Flanges, flange facing drilling, and protecting shall be as specified for flanged pipe. Bolts and nuts for flanged joints shall be Type 316 stainless steel unless otherwise stated on the Plans or directed by the Engineer.

Except where otherwise directed by the Engineer, gaskets for flanged joints shall be of the full-face type, meeting the requirements of ANSI B16.21. Gaskets shall be rubber with cloth insertion, as made by the Crane Company, Garlock Packing Company, U.S. Rubber Company, or equal.

W-10.05 Mechanical Joints

Mechanical joints shall meet the applicable requirements of AWWA C111.

W-10.06 Push-on Joints

Push-on joints shall be of the bell and spigot type which employs a single, elongated grooved gasket to affect the joint seal. Push-on joints shall meet the applicable requirements of AWWA C111.

W-10.07 Wall Castings, Connecting Pieces, and Special Fittings

Wall castings and connecting pieces, such as bell and bell; bell and spigot; bell and flange; flange and flange; flange and spigot; and flange and flare, shall meet the requirements of ANSI Specification A21.10. Unless otherwise shown or specified, fittings 14 inches and larger shall have a pressure rating of 250 psi.

Where special fittings are required, they shall be of an approved design and shall have the same diameters and thicknesses as standard fittings, unless otherwise required, but their laying lengths and other functional dimensions shall be determined by their positions in the pipelines and by the particular piping materials to which they connect.

Where watertightness is essential and at other locations where indicated, wall castings shall be provided with an integrally cast intermediate collar located at the center of the wall.

W-10.08 Sleeve-Type Couplings

Except where standard solid sleeves or split sleeves are shown or specified, sleeve-type couplings for ductile iron pipe shall be Style 38 couplings as made by Dresser Industries, Inc., or Type 411 as made by Smith-Blair, or equal. Gaskets shall be of molded rubber, Dresser Plain Grade 27, Smith-Blair 003, or equal. Middle rings shall be without a pipe stop and shall be at least 1/4 inch thick and 5 inches wide for 8-inch and smaller pipe, 3/8 inch thick and 7 inches wide for 10-inch through 30-inch pipe, and 1/2 inch thick and 10 inches wide for 36-inch and larger pipe with follower rings of appropriate thickness, unless otherwise shown or specified.

Sleeve-type couplings shall be shop coated with Dresser Red "D" Shop-Coat, Smith-Blair Standard Blue Shop Coat, or equal nontoxic material compatible with the finished coatings specified.

W-10.09 Coatings and Linings

Pipe which is to be buried shall have the standard exterior coating specified in AWWA C151-8.1.

Unless otherwise shown on the Plans or specified, all ductile iron pipe and fittings shall have a cement-mortar interior lining meeting the requirements of AWWA C151-8.2.

The weight and class designation shall be painted conspicuously in white on the outside of each pipe, fitting, and special casting after the shop coat has hardened.

W-10.10 Harnessing

Ductile iron pipe and fittings with mechanical joints that require harnessing shall be provided with ductile iron retainer glands, Megalug, as manufactured by EBAA Iron, or equal. The glands shall be installed in accordance with the manufacturer's recommendations. Set screws shall be tightened to 75 foot-pounds torque. Where the glands are to be buried or not exposed to view, the assembly shall be given 2 heavy coats of asphalt varnish after installation. Ductile iron pipe and fittings with push-on joints that require harnessing shall be Clow F-128 "Super Lock Joint," American Cast Iron Pipe "Lok-Fast Joint," U.S. Pipe and Foundry Company "TR Flex," or equal.

W-10.11 Lining for Ductile Iron Gravity Pipe

All ductile iron pipe and fittings, unless otherwise shown or specified, shall be provided with a special interior lining. For sizes 8 inches in diameter and above, the lining material shall be virgin polyethylene complying with ASTM D 1248 (40 mils thick) heat bonded to the interior of the pipe for all pipe sizes. For 6-inch diameter, the lining material shall either be the aforementioned polyethylene system or a 40 mil thick coal tar epoxy system. All pipe joint bells shall be coated on the inside with the same lining material as used in the pipe barrel. All field cuts shall be field coated with 40 mils of high build epoxy compatible with the lining.

W-10.12 Polyethylene Encasement

Polyethylene encasement shall be installed on all ductile iron pipe and fittings within the sections indicated on the Plans or as directed by the Engineer and in accordance with ANSI/AWWA C105/A21.5.

Although not intended to be a completely air-and-water-tight enclosure, the polyethylene shall prevent contact between the pipe and the surrounding backfill.

Polyethylene encasement shall be installed in accordance with the pipe manufacturer's instructions, or in a manner acceptable to the Engineer. Polyethylene encasement shall extend 1 foot beyond the joint in both directions (a total of 2-foot overlap) and shall be adhered to said joint with 2-inch wide green marking tape. The slack width shall be taken up at the top of the pipe to

make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points. Upon installation of the encasement, any cuts or damaged portions of the polyethylene encasement shall be securely mended with tape or with a short length of polyethylene sheet, or a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.

Backfill material shall be the same as specified for pipe without polyethylene wrapping; however, extra care should be taken that the backfill be free from cinders, refuse, boulders, rocks, stones, or other materials that could damage the encasement. Special care shall be taken to prevent damage to the polyethylene wrapping when placing backfill.

Because prolonged exposure to sunlight will deteriorate polyethylene film, such exposure prior to backfilling the wrapped pipe shall be kept to a minimum.

W-10.13 Ductile Iron Pipe Exterior Coating

All pipe and fittings shall have an exterior asphaltic coating conforming to the following requirements:

Viscosity, KU at 25 degrees C	56-60
Flashpoint, degrees F (TCC)	40 degrees F Min
Dry set to touch, minutes	6
Dry hard, minutes	22

W-10.14 Force Main Identification

Ductile iron pipe stormwater force main shall be continuously spiral wrapped with 2-inch wide green stick-on vinyl tape prior to installation for permanent identification purposes. The tape shall have a minimum thickness of 6 mils with a minimum tensile strength of 22 pounds per inch and a minimum adhesive factor of 40 ounces per inch. The pipe shall be clean and dry when wrapped.

SECTION 15 - LAYING AND JOINTING PIPE FOR FORCE MAINS AND SEWERS

W-15.01 General

The installation, delivery, transportation, unloading, and stringing of pipes, fittings, and accessories for force mains and sewers shall be done in accordance with AWWA C600 for ductile iron pipe and ASTM Des: C 12 for concrete pipe and ASTM D 2321 and pipe manufacturer's recommendations for PVC pipe, as modified or supplemented by the specifications of this section and by the details shown on the Plans.

Proper and suitable tools and appliances for the safe and convenient cutting, handling, and laying of the pipe and fittings shall be used.

Suitable fittings shall be used where shown and at connections where grade or alignment changes require offsets greater than those recommended by the pipe manufacturer.

Pipes and fittings shall be thoroughly cleaned before they are laid and shall be kept clean until they are accepted in the completed work.

All lines shall be closed off with bulkheads when pipe laying is not in progress.

Before being laid, all pipe and specials shall be thoroughly examined for defects, and no piece shall be installed which is known to be defective. If any defective piece should be discovered after having being installed, it shall be removed and replaced with a sound one in a satisfactory manner by the Contractor at his own expense.

Pipe shall be thoroughly cleaned before it is laid and shall be kept clean until it is accepted in the completed work. Special care shall be exercised to avoid leaving bits of wood, dirt, and other foreign particles in the pipe. If any such particles are discovered before the final acceptance of the work, they shall be removed and the pipe cleaned at the Contractor's expense.

Pipe laying for stormwater or wastewater shall begin at the low end of a run and proceed upgrade. Generally, all such pipe shall be laid with bells or grooves pointing uphill. Each pipe shall be carefully placed and checked for line and grade.

Adjustments to bring pipe to line and grade shall be made by scraping away or filling in granular material under the body of the pipe, but in no case by wedging or blocking up the barrel. The faces of the spigot ends and the bells shall be brought into fair contact, and the pipe shall be firmly and completely shoved home. As the work progresses, the interior of the pipelines shall be

cleaned of all dirt and superfluous materials of every description. All lines shall be kept absolutely clean during construction. Pipelines shall be laid accurately to line and grade.

Gaskets for pipe joints shall be stored in a cool place and protected from light, sunlight, heat, oil, or grease until installed. Any gaskets showing signs of checking, weathering, or other deterioration will be rejected.

Pipe shall be of the types, sizes, and classes shown on the Plans or as listed in the Contract Items.

Each piece of pipe shall be inspected and cleaned before it is lowered in the trench and any lumps or projections on the face of the spigot or tongue end or the shoulder shall be cut away. No cracked, broken, or defective pieces shall be used in the work.

Concrete pipe manufactured with a plastic sheet liner shall be laid so that the liner is on the crown of the pipe and placed symmetrically about the vertical centerline of the pipe.

Pipe laying will be permitted only in dry trenches having a stable bottom. Where groundwater is encountered, the Contractor shall make every effort to secure an absolutely dry trench bottom.

If, in the opinion of the Engineer, the Contractor has failed to obtain an absolutely dry trench bottom by improper or insufficient use of all known methods of trench dewatering, the Engineer may then order the Contractor to excavate below grade and place sufficient selected fill material, crushed stone, or Class I concrete over the trench bottom at the Contractor's own expense.

If all efforts fail to obtain this condition and the Engineer determines that the trench bottom is unsuitable for pipe foundation, he will order in writing the kind of stabilization to be constructed.

W-15.02 Transportation and Delivery

Every precaution shall be taken to prevent injury to the pipe during transportation and delivery to the site. Extreme care must be taken in loading and unloading the pipe and fittings. Such work must be done slowly with skids or suitable power equipment, and the pipe shall be under perfect control at all times. Under no condition shall the pipe be dropped, bumped, dragged, pushed, or moved in any way which will cause damage to the pipe or coating. When handling the pipe with a crane, a suitable pipe hook or sling around the pipe shall be used. Under no condition shall the sling be allowed to pass through the pipe unless adequate measures are

taken to prevent damage to the pipe ends.

If in the process of transportation, handling, or laying, any pipe or special is damaged, such pipe or pipes shall be replaced or repaired by the Contractor at his own expense.

The Contractor shall furnish and install suitable blocking and stakes so as to prevent the pipe from rolling. The type of blocking and stakes, and the method of installation, shall be approved by the Engineer.

W-15.03 Pipe Laying - Trenches

Pipelines shall be laid in trench excavation on bedding material as specified under the Workmanship and Materials section W-2 headed "Backfilling," Class I concrete cradle or other foundations as shown on the Plans, specified, or ordered in writing by the Engineer. The pipe shall be properly secured against movement, and pipe joints shall be made in the excavation as required.

The pipe bedding shall be carefully graded, compacted, and formed to fit the bottom quadrant of the pipe. Bell holes shall be cut out for each joint as required to permit the joint to be properly made and allow the barrel of the pipe to have full bearing throughout its length.

Where pipelines are laid in Class I concrete cradle or encasement, the installation shall conform to the requirements of the Workmanship and Materials section W-14 headed "Pipe Cradles and Encasements."

Pipelines laid on other type foundations shall be installed as specified for such other foundations or as directed in writing by the Engineer.

W-15.04 Lateral Detection Tape

Detectable underground marking tape shall be installed over all laterals from the edge of pavement to the property line. The tape shall be Harris Industries, Inc. encased aluminum foil, or equal. The 2-inch-wide tape shall be APWA green and reverse printed bearing the identification of the pipe below (“Sewer” or “Storm Drain”) it and a warning such as "CAUTION."

The tape shall be buried 4-6 inches. After trench backfilling, the tape shall be placed in the backfill and allowed to settle into place with the backfill.

W-15.05 Mechanical Joints for Ductile Iron Pipe

In making up mechanical joints, the spigot shall be centered in the bell. The surface with

which the rubber gasket comes in contact shall be cleaned thoroughly and the gasket shall be washed thoroughly with soapy water just prior to assembly of the joint. The gasket and gland shall be placed in position, the bolts inserted, and the nuts tightened fingertight. The nuts then shall be tightened by means of a torque wrench in such a manner that the gland shall be brought up evenly into the joint. The following range of bolt torques shall be applied:

Bolt Size Inches	Range of Torque Foot-Pounds
5/8	45 - 60
3/4	75 - 90
1	80 - 100
1-1/4	105 - 120

If effective sealing is not obtained at the maximum torque listed above, the joint shall be disassembled and reassembled after a thorough cleaning.

All bolts and nuts shall be field coated with a bituminous coating after assembly of the joint.

W-15.06 Push-on Joints for Ductile Iron Pipe

In making up push-on joints, the gasket seat in the socket shall be cleaned thoroughly and the rubber gasket shall be wiped clean with a cloth. The gasket shall be placed in the socket and a thin film of lubricant shall then be applied to the inside surface of the gasket that will come in contact with the entering pipe. The plain end of the pipe to be entered shall be cleaned thoroughly and placed in alignment with the bell of the pipe to which it is to be joined. The joint shall be made up by exerting sufficient force on the entering pipe so that its plain end is moved past the gasket until it makes contact with the base of the socket.

W-15.07 Joining of PVC Pipe-Gravity

The assembly of gasketed joints shall be performed as recommended by the pipe manufacturer. In all cases clean the gasket and bell, especially the groove area and the spigot area, with a rag, brush or paper towel to remove any dirt or foreign material before the assembly. Lubricant shall be applied as specified by the pipe manufacturer.

Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket

uniformly. Apply firm steady pressure either by hand or by bar and block assembly until the spigot easily slips through the gasket.

If undue resistance to insertion of the pipe end is encountered or the reference mark does not position properly, disassemble the joint and check the position of the gasket. If it is twisted or pushed out of its seat ("rolled"), inspect components, repair or replace damaged items, clean the components, and repeat the assembly steps. Be sure both pipe lengths are in concentric alignment. If the gasket was not out of position, verify proper location of the reference mark.

To join field-cut pipe, first square cut the pipe end. Use a factory-finished beveled end as a guide for proper bevel angle and depth of bevel plus the distance to the insertion reference mark. Bevel the end using a pipe beveling tool or a wood rasp which will cut the correct taper. Round off any sharp edges on the leading edge of the bevel.

W-15.08 Joining Concrete Pipe

Before joining concrete pipe using flexible rubber gaskets, the joint surfaces of both the bell and spigot (tongue and groove) ends shall be wiped clean. Any lumps, projections, burrs, or chips which would interfere with the proper compression of the gasket shall be repaired. The spigot or tongue end with the gasket in place and with all surfaces lubricated as recommended by the manufacturer, shall be inserted into the bell or groove. Pressure shall be applied to seat the pipe properly in the bell or groove. Voids under the pipe shall be tamped full of granular material to provide full bearing for the pipe.

Curves for reinforced concrete pipe sewers shall be constructed with standard pipe where the opening of the joint on the outside of the curve is less than 1/2 inch. Where greater opening of the joint would be required, the curves shall be constructed using beveled or radius pipe with standard joints.

W-15.09 Concrete Pipe Rubber Gasket Joints

Rubber gaskets shall be of the O-ring type or equivalent cross section approved by the Engineer. The composition and properties of the gaskets for gravity flow sewers shall meet the requirements of ASTM Des: C 443.

Composition and properties for concrete pressure pipe gaskets shall meet the requirements of the specifications for the concrete pressure pipe with which the gasket will be used.

In making O-ring rubber gasketed joints, the gasket and the pipe socket shall be lubricated with an approved rubber gasket lubricant, and the gasket shall be stretched over the spigot and

placed accurately in position. The tongue or spigot end shall be carefully centered in the socket of the preceding pipe so as to avoid displacement of the gasket, and the pipe shall be drawn home fully compressing the gasket. Adjustments to line and grade shall be made in such a manner that the compressed rubber gasket will not be disturbed. Before proceeding with backfilling, the joint shall be felt completely around to determine whether the gasket is in its proper position. If the gasket can be felt out of place, the pipe shall be withdrawn and the gasket examined for cuts or breaks. If the gasket has been damaged, it shall be replaced with a new one before the pipe is replaced.

Rubber gaskets shall be stored in a cool place and protected from light, sunlight, heat, oil, or grease until installed. Any gaskets showing signs of checking, weathering, or other deterioration will be rejected.

W-15.10 Temporary Bulkheads

At the ends of contract sections, where adjoining pipelines have not been completed, and in connections built into pipelines where adjoining pipelines or structures have not been completed and are not ready to be connected, temporary bulkheads, approved by the Engineer, shall be built. Such bulkheads encountered in connecting sewers or structures included in the Contract, or pipelines or structures previously built, shall be removed by the Contractor when the need for them has passed or when ordered by the Engineer.

W-15.11 Testing

The testing of pipelines shall be done in accordance with the requirements of the Workmanship and Materials section W-18 headed "Leakage Tests."

W-15.12 Joining Clay or PVC Pipe to Ductile Iron Pipe

The joining of clay pipe to ductile iron pipe shall be accomplished with flexible compression couplings. Such couplings shall meet the requirements of ASTM DES: C 425 and shall be Series No. 1002 flexible polyvinyl chloride couplings with stainless steel compression bands as manufactured by Fernco Joint Sealer Co., Ferndale, Michigan; Band-Seal couplings as manufactured by Mission Clay Products Corp., Whittier, California; or approved equal. Installation of flexible couplings shall be done in accordance with the manufacturer's instructions. After the joint has been completed, any voids in the excavation beneath the coupling shall be thoroughly tamped full of granular fill

material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

The joining of PVC pipe to ductile iron pipe shall be accomplished with rigid PVC C900 x SDR-35 adapter couplings. Such couplings shall be molded of PVC material meeting ASTM D-1784 specifications. Joints shall meet ASTM D-3213 requirements with gaskets conforming to ASTM F-477. The adapter couplings shall be manufactured by Harco, Lynchburg, VA, or equal. Installation of rigid couplings shall be done in accordance with the manufacturer's instructions. After the joint has been completed, any voids in the excavation beneath the coupling shall be thoroughly tamped full of granular fill material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

W-15.13 Connection to Manholes

The Contractor will be required to submit a shop drawing, detailing the method of connecting the proposed pipe to the manhole and making it watertight:

1. For connecting vitrified clay or ductile iron pipe, the Contractor shall use nonshrink grout to seal the opening between the pipe O.D. and manufactured opening in the manhole or flexible rubber boot, precast into the manhole. The boot shall have stainless steel bands to compress and seal to the proposed pipe or shall be a compression type, such as A-Lock.

2. For connecting PVC pipe, the Contractor shall use a flexible rubber boot, precast into the manhole. The boot shall have stainless steel bands to compress and seal to the proposed pipe or shall be a compression type, such as A-Lock. Should the flexible rubber boot need to be relocated or when connecting to an existing manhole, the Contractor shall perform the connection by one of two methods. The preferred method is to core the manhole and install a rubber boot. The rubber boot shall be manufactured by Kor-n-Seal, or equal. The boot shall be installed, and the PVCP connection shall be in accordance with the manufacturer's instructions. If the manhole cannot be cored or if the manhole is constructed of brick, the connection shall be made with a PVC manhole adapter which has an exterior impregnated silica surface layer. The adapter shall be manufactured by GPK Products, Inc., Fargo, ND, or equal. The adapter shall be installed and grouted into the manhole wall in accordance with the manufacturer's instructions with nonshrink grout. The PVCP shall be inserted through the adapter.

W-15.14 Joint Grouting

Joints for concrete pipelines using rubber gaskets and steel end rings shall be grouted on the outside with cement mortar composed of one part Type IA portland cement to one part sand by volume. The materials shall be thoroughly mixed to produce a uniform mortar with all aggregate particles well coated.

The joint grouting shall not advance closer than two pipe lengths to the laying operations. In grouting the joint, a cloth diaper shall be used to encase the outside diameter of the bell of the pipe and adequately straddle the joint recess so as to keep out dirt and to serve as a form for grouting. The joint space shall be filled with cement mortar, just thin enough to run around the joint. The diaper is to be left in place permanently. Before the mortar has taken its initial set, the diaper shall be examined, and if not completely filled, additional mortar shall be forced into the joint.

SECTION 17 - LAWN REPLACEMENT

W-17.01 General

The Contractor shall replace all lawn areas which have been removed or damaged due to construction. Lawn replacement includes fine grading the areas to be restored and furnishing and placing topsoil, fertilizer, sod, sprigs, seeding, and maintaining all areas. Grassing and mulching or sodding lawn areas will be required as directed. Grassing shall be accomplished by seeding.

Sod shall be Argentine Bahia, St. Augustine, or other approved native grass sod matching existing, and shall be well matted with grass roots. It shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of 2 inches. The sod shall be live, fresh and uninjured, and shall contain sufficient moisture at the time of planting to induce growth. The type and quality of sod shall be approved by the Engineer before placing.

Grass seed shall be Argentine Bahia, 60 #/acre from March 1 to November 1; 50 #/acre with 20 #/acre of rye grass seed from November 1 to March 1. Argentine Bahia seed shall be a scarified seed having a minimum active germination of 40% and total of 85%.

Mulch material shall be free of weeds and shall be oat straw or rye, Pangola, peanut, Coastal Bermuda or Bahia grass hay.

W-17.02 Topsoil

Where areas are to be restored by sodding, topsoil shall be placed to a minimum compacted depth of 2 inches over the subgrade. Where areas are to be restored by grassing, topsoil shall be placed to a minimum compacted depth of 4 inches over the subgrade. All topsoil shall be suitable excavated topsoil which has been segregated or other topsoil material approved by the Engineer. Topsoil shall be free from stones, roots, sticks, or other foreign substances.

W-17.03 Water

The Contractor shall furnish at his own expense all water required for lawn replacement and maintenance of the work until final acceptance.

W-17.04 Construction Methods

Prior to sodding or grassing, the Contractor shall fine grade the subgrade to 4 inches below finished grade. Topsoil shall be spread over the subgrade to a uniform depth and density. Topsoil

shall be uniformly compacted by a light hand roller weighing between 250 and 750 pounds to the specified depths for sodding or grassing.

Immediately before sodding, 14-4-14 or 15-0-15 fertilizer shall be applied at the rate of approximately 600 pounds per acre, either in the furrows or by broadcasting and raking, into the planting area. After the surface has been properly prepared, the sod shall be placed and firmly embedded by light tamping. Additionally, dolomite (lime) shall be applied at a rate of 2 tons per acre.

Immediately after the sod has been planted, if the soil does not contain sufficient moisture to ensure growth, water shall be applied twice daily for the first week, once in the morning or late evening and once at approximately 2:00 P.M. Water shall then be applied once a day over the next 2 weeks and alternating days for an additional 2 weeks. If rooting has not taken place by the end of the third week, 1 daily watering shall continue until sod is firmly rooted.

One week after the sod has been planted, a complete fertilizer with minor elements shall be applied weekly at the rate of 1# nitrogen per 1,000 square foot in a 2-1-2 or 4-1-2 formula for a period of 4 weeks, and thereafter every 2 weeks for an additional 30 days. The ground shall not be wet when the fertilizer is applied but will be immediately watered after application of the fertilizer to remove it from the leaf area.

Prior to grassing, 14-4-14 or 15-0-15 fertilizer shall be applied to the soil at the rate of approximately 300 pounds per acre. Grass seed at the specified rate per acre shall then be raked into the soil and covered with mulching material. The area shall then be thoroughly rolled with approved equipment.

After the grass has been planted, if the soil does not contain sufficient moisture to ensure growth, water shall be applied as directed by the Engineer. After the grass has started growing, fertilizer shall be applied uniformly over the area weekly, at a rate of 0.5# nitrogen and potash per 1,000 square feet, until turf cover the area. The fertilizer shall not be applied unless the surface of the ground or sod is sufficiently moist to quickly dissolve the fertilizer.

W-17.05 Lawn Maintenance

The Contractor during construction and until sod is established, shall keep all replaced lawn areas in good, healthy, insect free, moist condition by watering, replanting or resodding, weeding, fertilizing, and cutting as specified, and directed by the Engineer.

SECTION 18 - LEAKAGE TESTS - SEWERS

W-18.01 General

All pipelines will be tested and inspected for infiltration or leakage by the Engineer with the assistance of the Contractor prior to final acceptance of the work. All tests and inspections will be conducted in a manner to minimize as much as possible any interference with the Contractor's work or progress.

The Contractor shall notify the Engineer when the work is ready for testing and inspecting, and tests and inspections shall be made as soon thereafter as practicable under the direction of the Engineer. Personnel for reading meters, gauges, or other measuring devices will be furnished by the Engineer. The Contractor shall furnish all other labor, materials, services, and equipment, including power, fuel, meters and gauges, pumps, bulkheads, backflow preventers, water, and other items and apparatus necessary for making leakage tests, preparing pipelines for testing, assembling, placing, and removing testing equipment, and placing pipelines in service, all to the satisfaction of the Engineer. Only City water shall be used for testing unless otherwise approved by the Engineer. The water shall be obtained and metered from sources approved by the Engineer. After testing, the water shall be disposed of by the Contractor into storm sewers or drainage courses approved by the Engineer.

W-18.02 Tests of Sewer - General

All sewers shall be tested for infiltration or leakage after completion of backfilling. All wyes, house connections, and stubs shall be suitably plugged or bulkheaded to the satisfaction of the Engineer prior to testing. All sewers shall be cleaned and pumped out as necessary prior to testing.

Sewers shall be tested for infiltration, unless otherwise ordered by the Engineer. If the Engineer determines that groundwater conditions are not suitable for infiltration testing, sewers shall be tested for leakage. Sewers may be tested for leakage by measuring leakage out of the sewer or by air testing. The length of sewer to be tested shall be subject to prior approval by the Engineer.

The length of house connections, if any, will be included in the total length of sewer under test when computing infiltration or leakage.

All testing equipment and the arrangement of such equipment shall be subject to the prior approval of the Engineer. Sections of sewers under test shall be arranged to prevent the internal

pressure on any joint from exceeding 10 psi.

Refer to Section 11 - PVC Pipe Gravity for specific requirements for infiltration and leakage testing for PVC gravity pipe.

W-18.03 Infiltration Test of Sewers

Infiltration tests shall be performed when the groundwater level is a minimum of 2 feet above the crown of the sewer at the highest point in the test section. No such tests shall be started until the infiltration conditions are established in the work to be tested. The Contractor shall provide suitable
observation wells along the line of the work or other approved means to determine the groundwater level.

Infiltration tests will be made by measuring the infiltrated flow of water over a measuring weir set up in the invert of the sewer a distance, as approved by the Engineer, from a temporary bulkhead or other limiting point of infiltration. Testing shall be for a minimum period of 4 hours. The quantity of infiltration for any section of the sewer shall not exceed 50 gallons/mile/day/inch of pipe diameter.

W-18.04 Leakage Test of Sewers

Leakage tests shall be performed by bulkheading the section of sewer under test at the manhole, at the lower end, and filling the sewer with clear water until the water level is up a minimum of 2 feet above the crown of the sewer or a minimum of 2 feet above the groundwater level, whichever is greater, in the manhole at the highest point in the section. Leakage will be the measured amount of water added to maintain the level in the higher end manhole. Tests shall be carried on a minimum of 4 hours with readings at 30-minute intervals. The quantity of leakage for any section of the sewer shall not exceed the limits specified for infiltration in the subsection headed "Infiltration Test of Sewers."

W-18.05 Air Leakage Test of Sewers

Air pressure leakage tests shall be limited to sewers 30 inches in diameter and smaller. The maximum allowable air leakage is based on prewetted pipe walls. The contractor may, therefore, fill the pipe with clear water and then empty the pipe prior to air testing. When pipe walls are prewetted, air leakage tests shall be completed within 24 hours after filling the sewer section to be tested.

Air pressure tests shall be made by placing the sewer under 3.0 psig air pressure and measuring the volume of air required to maintain this pressure. The rate of air leakage shall be determined when the system reaches an equilibrium state and air flow shall be read by means of an approved rotameter.

The maximum rate of air loss shall be 0.003 cfm per square foot of interior pipe surface, and the maximum air flow shall not exceed 2.0 cfm when the total pressure on the sewer is maintained at 3.0 psig. When the groundwater level is above the invert of the sewer, but below a level adequate for infiltration testing, the maximum air loss shall be reduced 6 percent for each foot of groundwater above the sewer invert.

Air testing equipment shall be arranged so that compressors, valving, gauges, and other test devices are located at the ground surface. Air testing equipment shall have an approved air relief arrangement to prevent the sewer from being pressurized to greater than 10.0 psig.

W-18.06 Leakage Tests of Force Mains

Force mains shall be tested as a whole or in sections valved or bulkheaded at the ends. The mains shall be tested under an average hydrostatic pressure of not less than 100 pounds per square inch, unless otherwise indicated in the Specific Provisions. The pressure shall be applied to the pipeline through a tap in the pipe by means of a hand pump or other method and shall be maintained for a minimum of 4 hours or as referenced in AWWA Standard C605. Air shall not be used for testing force mains. The leakage for all force mains, as determined by the above test, shall not exceed the allowable leakage for PVC water mains and shall comply with requirements of AWWA Standard C605 " Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water" Section 7 (less references to disinfection).

All harnessed sections of the buried force main shall be completely backfilled before such sections are tested.

W-18.07 Repairing Leaks

When infiltration or leakage occurs in excess of the specified amount, defective manholes, pipe, pipe joints, or other appurtenances shall be located and repaired at the expense of the Contractor. If the defective portions cannot be located, the Contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a sewer or force main within the allowable infiltration or leakage limits upon such retesting as necessary and directed by the Engineer.

* * *

SECTION 21 - CONCRETE STORM SEWER PIPE

W-21.01 General

All concrete storm sewer pipe 15 inches in diameter and larger shall be reinforced concrete pipe.

W-21.02 Standards

Concrete pipe shall be precast or machine made and shall be the product of a concern that can demonstrate by tests and installation records satisfactory experience in manufacturing concrete pipe of the quality and type specified.

Reinforced concrete pipe operating without internal hydrostatic pressure shall meet the requirements of ASTM Des: C 76 except that elliptical reinforcing cages shall not be used.

The classes of concrete pipe for the various pipelines are shown on the Plans or listed in the Contract Items.

W-21.03 Reinforced Concrete Pipe

All reinforced concrete pipe shall be manufactured in lengths of not more than 16 feet and not less than 7-1/2 feet, except where shorter lengths are required for construction of curves in lines or at junctions with structures that cannot be adjusted in location.

1. Circular Pipe: ASTM C 76, Class III, Wall B. Use Class IV, where indicated.

2. Horizontal Elliptical: ASTM C 507, Class HE-III, with tongue and groove joints and bitumastic plastic gasket joints complying with federal specification SS-S-210A and AASHTO M-198-B or cement mortar complying with ASTM C 387, Type N. Use Class HE-IV, where indicated.

W-21.04 Joints

1. Circular Pipe: Bell and spigot joints and "O" ring compression gasket joints complying with ASTM C 443.

2. Horizontal Elliptical: Tongue and groove joints and bitumastic plastic gasket joints complying with federal specification SS-S-210A and AASHTO M-198-B or cement

mortar complying with ASTM C 387, Type N. Use Class HE-IV, where indicated.

W-21.05 Proof of Design

Prior to the manufacture of any reinforced concrete sewer pipe, details of the steel reinforcing and concrete strength together with proof of the adequacy of the pipe design for each size and class of pipe shall be submitted to the Engineer for approval.

As proof that the design of the pipe meets the 0.01-inch crack and ultimate load strength requirements for this class of pipe, the manufacturer shall submit the results of properly certified three-edge-bearing tests already witnessed and verified by an approved independent testing laboratory on identical pipe of identical design or if such three-edge-bearing test results are not already available or are not acceptable, shall have one pipe, at least four feet in length, tested in three-edge-bearing and witnessed and verified by an approved independent testing laboratory and shall submit certified test results. All costs associated with proof-of-design tests shall be borne by the Contractor.

W-21.06 Shop Testing

Concrete sewer pipe shall be tested in accordance with the applicable provisions of ASTM Des: C 497 as required by the ASTM Specification for the pipe.

The basis of acceptance for reinforced concrete pipe shall be in accordance with Section 5.1.1 of ASTM Des: C 76. During manufacture, at least one pipe section shall be shop tested to destruction in three-edge-bearing in the presence of the City's authorized inspection engineers for each 1,000 feet of pipe or fraction thereof made. The test pipe sections shall be a minimum of four feet in length. The manufacturer shall have a pipe casting form, of the same inside diameter as the pipe being manufactured, together with the proper reinforcing steel cages, available at all times during manufacture for the purpose of casting test pipes at the times designated by the Engineer. Test pipe sections shall not be lined with plastic sheet. No pipe shall be tested at an age of less than 12 days, and no pipe shall be delivered to the job site until satisfactory completion of shop tests on representative pipe specimens for each 1,000-foot lot of pipe manufactured. Proof-of-design tests performed on pipe manufactured for this Contract will be accepted by the City in lieu of shop tests for the first 1,000-foot lot of pipe of each size and class manufactured.

The Contractor shall obtain, review, and submit to the Engineer four copies of certified test reports made by the City's inspection engineers. All costs associated with shop testing shall be borne by the Contractor.

W-21.07 Transportation and Delivery

Every precaution shall be taken to prevent injury to the pipe during the transportation and unloading of the pipe at he site of the work. The pipe shall be unloaded using skids or suitable power equipment if necessary, and the pipe shall be under perfect control at all times. Under no conditions shall the pipe be dropped, dumped, or dragged.

A suitable pipe hook or rope sling around the pipe shall be used when handling the pipe with a crane. The crane shall be placed so that all the lifting is done in a vertical plane. under no condition will the sling be allowed to pass through the pipe unless adequate measures are taken to prevent damage to the pipe ends. Interior hooks or slings shall not be used to handle concrete pipe with an interior lining or coating. Lifting holes in the pipe will not be permitted.

If any pipe or special is damaged in the process of transportation and handling, such pipe or pipes shall be rejected and immediately removed from the site and replaced at the Contractor's expense.

The Contractor shall schedule the shipments of pipe to conform to his progress schedule for laying the pipe and shall provide all storage space to meet his requirements.

W-21.08 Laying and Jointing Pipe

Concrete pipe shall be installed in accordance with requirements of the Workmanship and Materials section headed "Laying and Jointing Pipe for Force Mains and Sewers."

SECTION 27 - DEMOLITION

W-27.01 General

Demolition includes all work necessary for the removal and disposal of masonry, steel, reinforced concrete, sheet metal fencing/retaining wall, riprap retaining wall, granite curb retaining wall, plain concrete, wastewater equipment, piping, electrical facilities, and any other material or equipment shown or specified to be removed. Dust control shall be provided and provision made for safety.

Demolition shall be carried out in such a manner that adjacent structures, which are to remain, shall not be endangered. The work shall be scheduled so as not to interfere with the day to day operation of the existing facilities, all in accordance with the Sequence of Operations specified in the Specific Provisions. Doorways or passageways in existing facilities shall not be blocked.

Care shall be taken to assure that concrete shall be broken and removed in reasonably small masses. Where only parts of a structure are to be removed, the concrete shall be cut along limiting lines with a specially designed saw so that damage to the remaining structure is held to a minimum.

Where appropriate, the existing granite curb retaining wall, riprap retaining wall, and any and all other concrete structures and/or materials within the existing project area should be demolished, retained on site, crushed on site, and used as material for the stone within the Gabion Basket Retaining Walls and Reno Mats lining the ditch bottom.

W-27.02 Requirements Prior to Demolition

The Contractor shall visit the site and inspect all existing structures. Special care shall be taken to observe and record any defects, which may exist in buildings or structures adjacent to but not directly affected by the demolition work. Prior to commencing the demolition, the Contractor shall provide the Engineer with a copy of this inspection.

Drawings of existing structures and equipment will be available for inspection by the Contractor at the office of the Engineer and Owner.

Warning signs, protection barriers and red warning lights shall be provided as necessary adjacent to the work as approved by the Engineer and shall be maintained during the demolition period.

Demolition work shall not be undertaken until all mechanical and electrical services affected by the work have been properly disconnected. Interconnecting piping or electrical services that are to remain in service either permanently or temporarily shall be capped, rerouted or reconnected in a manner that will not interfere with the operation of the remaining facilities.

Where the presence of hazardous chemicals, gases, flammable materials or other dangerous substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

W-27.03 Requirements During Demolition

The use of explosives will not be permitted.

All mechanical and electrical equipment shall be carefully protected against dust and debris.

All debris shall be removed from the structures during demolition and not allowed to accumulate in piles.

Safe access to and egress from all working areas shall be provided at all times with adequate protection from falling material.

Adequate scaffolding, shoring, bracing and protective covering shall be provided during demolition to protect personnel and equipment against injury or damage. Floor openings not used for material drops shall be covered with material substantial enough to support any loads placed on it. The covers shall be properly secured to prevent accidental movement.

Adequate lighting shall be provided at all times during demolition.

Areas below demolition work shall be closed to workmen while removal is in progress.

No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effectively protected.

No workmen shall stand on any wall to remove material except when adequate staging or scaffold protection is provided at a distance not exceeding 12 feet below the top of such walls and other reasonable precautions are taken. Whenever a workman is required to work at a height of more than 12 feet above a floor, platform, scaffold or the ground, he shall be equipped with a safety belt with a life line attached.

W-27.04 Disposal of Materials

All debris, rubbish, scrap pieces, equipment, and materials resulting from the demolition shall become the property of the Contractor and shall be removed from the site, except for the items designated by the Engineer to be salvaged.

SECTION 32 - VALVES

W-32.01 General

This section includes gate valves, check valves and ball valves. Valves for buried application shall be provided with mechanical joints. Plug valves and check valves shall be provided with flanged connections, unless noted otherwise on the plans. Air release valves shall be provided with threaded connections.

All valves of the same type shall be from a single manufacturer. Parts of valves of the same type and size shall be interchangeable.

The Contractor shall prepare and submit for approval complete detail drawings of all valves which shall include submittals for interior and exterior coatings.

All valves shall be carefully erected in their respective positions, free from all distortion and strain, and shall be packed and left in satisfactory operating condition.

W-32.02 Flanges

Flanges shall be cast solid and faced accurately at right angles to the axis of the casting. Flanges shall be faced and drilled and shop coated with a rust preventive compound before shipment.

Dimensions and drillings of flanges shall meet the requirements of ANSI B16.1 for working pressures of 125 pounds per square inch. Special drillings shall be provided where required.

W-32.03 Check Valves

Check valves, unless otherwise specified, shall be APCO Series 100 of the rubber flapper, horizontal, swing type designed to allow full diameter passage and to operate with a minimum loss of pressure. No other check valve will be approved for this project.

Check valves shall have body and body cover of heavily constructed cast iron meeting requirements of ASTM A48, Class 30. Check valve body shall have integrally cast-on end flanges. The flapper shall be rubber and have an "O" ring seating edge and be internally reinforced with steel. The flapper shall be easily replaced while the valve remains in place.

W-32.04 Gate Valves

Gate valves, unless otherwise specified, shall be Resilient Wedge, manufactured by DeZurik, or approved equal.

Gate valves shall have body and body cover of heavily constructed cast iron, meeting requirements of ASTM A48, Class 30. Valve body shall have integrally cast-on end flanges.

W-32.05 Ball Valves for Water Service

Manually operated ball valves for steel piping shall meet the following:

Rating	600 psi nonshock cold WOG
Code	MSS SP-110
Type	In-line, two piece, end entry, full port
Body/Bonnet	ASTM B584–C84400 bronze
Trim	
Seat	Reinforced Teflon
Ball	Brass, or chrome plated brass
Stem	Brass or bronze
Thrust Washer	Reinforced Teflon
Stem Seal	Teflon or Viton
End Connection	Union / Thread
Temp. Limitations	-20 to 400°F [-29 to 204°C]
Valve Operator	Lever
Manufacturers	Apollo 70-300 Series; NIBCO &-585-79-SU

W-32.06 Testing

All valves shall be given hydrostatic shop pressure tests at twice the working pressure specified. The valves shall be tested, first by applying the hydrostatic pressure with the valve open and then with the valve closed. The valves shall be tight and secure under the test pressure.

Valves shall be tested in place by the Contractor, as far as practicable, and any defects in valves or connections shall be corrected to the satisfaction of the Engineer.

W-32.07 Painting and Coating

Plug valves and check valves shall receive a factory interior and exterior shop coating of Tnemec Series 140 (4 mils thick).

All other valves shall receive a factory interior and exterior shop coating of an approved system.

Exterior surfaces of all valves, other than stainless steel, shall receive a field coat as indicated for in appropriate category in the Workmanship & Materials Section W36 titled “Painting”.

SECTION 33 - LEAKAGE TESTS - PUMPING STATIONS

W-33.01 General

All pipelines and structures required to be watertight shall be tested for leakage by the Contractor under the direction of the Engineer. Air and gas lines shall be tested with compressed air and all other pipelines shall be tested with water under the pressures specified herein.

All tests shall be conducted in a manner to minimize as much as possible any interference with the Contractor's work or progress.

The Contractor shall notify the Engineer when the work is ready for testing, and tests shall be made as soon thereafter as possible. Personnel for reading meters, gauges, or other measuring devices, will be furnished by the Engineer, but all other labor, equipment, air, water, and materials, including meters, gauges, smoke producers, blower, fuel, bulkheads, and accessory equipment, shall be furnished by the Contractor.

W-33.02 Pressure Tests

Pressure tests of pipelines shall be made by maintaining the fluid in the pipe at the specified pressure for a period of 30 minutes. The pipelines shall show no leakage.

Test pressures for the various pipelines shall be as follows:

Type of Pipeline	Test Pressure psi
Sewage (Pump Suctions)	5
Sewage (Pressure) - Pump Discharge	100
Water	125
Sump pump discharge	25
Compressed air	200
Drains	5

W-33.03 Tests of Structures

Leakage tests of wet wells and similar purpose structures shall be made before backfilling by filling the structure with water to the overflow height and observing the water surface level for the following 24 hours. Inspection for leakage will be made of the exterior surface of the structure, especially in the area around the construction joints.

Leakage will be accepted as within the allowable limits for structures from which there are no visible leaks and in which the water surface drops not more than 1/2 inch during the 24 hour test.

If visible leaks appear, the structure shall be repaired by removing and replacing the leakage portions of the structure, waterproofing the inside, or by other methods approved by the Engineer.

Water for the initial filling of the structure will be supplied by the City. Water for subsequent fillings, if required, shall be at the expense of the Contractor.

SECTION 36 - PAINTING

W-36.01 General

Painting includes furnishing all labor, materials, and services to paint all structures and equipment specified and required to complete the work, including, but not limited to, the following: preparation of surfaces; field painting of existing and proposed structures, piping, conduit, ductwork and equipment as specified, and the marking of existing piping and electrical conduit. The work shall include furnishing samples of paints and color charts.

Paint and other materials shall be of the type and quality of the manufacturer on which the coating schedule is based. All coats of paint for any particular surface and thinners used shall be from the same manufacturer. The treatment of the surface to be painted and the application of paint shall be in accordance with the instructions of the manufacturer and as approved by the Engineer. The colors of paints shall be as approved by the Engineer. Specimens, approximately 8 by 10 inches in size, shall be prepared and submitted to the Engineer. The minimum number of specimen custom mixed colors submitted shall be 6 not including color coding colors. Only paint of approved manufacturers shall be delivered and stored at the site.

All painting shall be in accordance with the schedules included in this specification. A supplementary schedule of paint products shall be submitted, with mil thickness, to cover all paint applied. The schedule shall be in accordance with the recommendations of the manufacturer of the paint. The total mil thickness of all coatings shall be not less than the schedule included in this section.

W-36.02 Delivery and Storage

Paints, stains, varnish, or ingredients of paints to be mixed on the job shall be prepared, packed and labeled, and guaranteed by an approved manufacturer. All material shall be delivered to the site in original, unbroken containers.

The manner of and place for storing the painting materials at the site shall be as approved by the Engineer. The storage space shall be kept clean at all times. Every precaution shall be taken to eliminate fire hazards.

W-36.03 Surface Preparation

Prior to painting, all surfaces shall be prepared and cleaned in strict accordance with the paint manufacturer's recommendations and as directed by the Engineer. Surfaces shall be dry

before any paint is applied. Special surface preparation work shall be as directed by the manufacturer of the paint specified to be applied to the surface.

Metal Surfaces:

This includes all exterior and interior steel surfaces and all nonferrous metals. This applies to structural and miscellaneous steel, motors, designated housings and protective guards, piping, valves, stairs, and in general, all surfaces to be painted as designated in these specifications.

All surfaces shall be cleaned in accordance with Steel Structures Painting Council standards SSPC - SP1 Solvent Cleaning for removal of grease and oil. This standard allows for pressure washing, detergent cleaning, etc. Additional rust, loose paint, loose mill scale, etc., shall be removed in accordance with SSPC - SP2 Hand Tool Cleaning or SSPC - SP3 Power Tool Cleaning. All welds, beads, blisters or protuberances, other than identification markings shall be ground smooth. Pits and dents shall be filled with a suitable product as approved by the Engineer, and other imperfections shall be removed. Painted edges shall be sanded smooth with adjacent bare metal surfaces.

Where aluminum surfaces come in contact with incompatible metals, lime, mortar, concrete or other masonry materials, these areas shall be given two coats of asphalt varnish conforming to Fed. Spec. TT-V-51F.

Concrete and Wood Surfaces:

Surface preparation of all exterior concrete and wood surfaces shall be pressure washed to remove cobwebs, dirt, dust, and other surface contaminations. Mildew shall be treated with a 22% chlorine solution or otherwise by mixing equal parts solution bleach and water to the affected area. Loose paint and other defects shall be removed by hand; brushing, sanding, chipping or other hand tools or by power; brushes, impact tools, grinders, sanders or other power tools or by any combination thereof. Painted edges shall be sanded smooth to match adjacent bare surfaces.

All interior concrete and wood surfaces including ceilings, walls, and floors shall be cleaned similar to SSPC - SP1 Solvent Cleaning standards. Loose paint and other defects shall be removed by hand; brushing, sanding, scraping, chipping or other hand tools or by power; brushes, impact tools, grinders, sanders or other power tools or by any combination thereof. Painted edges shall be sanded smooth to match adjacent bare surfaces.

Priming shall be performed with Porter Acri-Pro 100, 100% Acrylic, or equal. First and second coats shall be performed with Porter Acri-Shield, 100% Acrylic, or equal. Concrete,

concrete masonry, and wood shall be thoroughly dry prior to painting."

W-36.04 Coatings

All paints and similar materials shall be mixed in galvanized iron pans or pails or other approved containers of adequate capacity. All paint shall be stirred thoroughly before being taken from the containers, shall be kept stirred while using, and all ready-mixed paint shall be applied exactly as received from the manufacturer without addition of any kind of drier or thinner, except as specified or as permitted or directed by the Engineer. Successive coats of paint shall be tinted to make various coats easily distinguishable. Undercoats of paint shall be tinted to the approximate shade of the final coat of paint. The paint shall be a minimum temperature of 60 degrees F before application.

Only skilled painters shall be used on the work, and specialists shall be employed where required. Paint shall be applied by brush, roller, or sprayer in accordance with the manufacturer's recommendation. Finished surfaces shall not show brush marks or other irregularities. Top and bottom edges of doors shall be painted. Undercoats on hollow metal work shall be thoroughly and uniformly sanded with No. 00 sandpaper or equal abrasive to remove all surface defects and provide a smooth, even surface.

Painting shall be a continuous and orderly operation to facilitate adequate inspection. All paint application methods shall be in accordance with the instructions of the paint manufacturer and as approved by the Engineer. Access panels, pipes, pipe covering, ducts, and other building appurtenances built into or adjoining walls to be painted shall be painted the same color as adjacent walls, unless otherwise directed by the Engineer. Hardware and accessories, fixtures, and similar items placed prior to painting shall be removed or protected during painting and replaced on completion of painting. All wall surfaces to be concealed by equipment shall be painted before installation of the equipment.

Areas under and adjacent to painted work shall be fully protected at all times and dripped or splattered paint shall be promptly removed. Painting shall not be done when the temperature is below 60 degrees F, or in dust-laden air, or until moisture on the surface has completely disappeared. If necessary, sufficient heating and ventilation shall be provided to keep the atmosphere and all surfaces to be painted dry and warm until each coat of paint has hardened. Any painting found defective shall be removed and repainted or touched up as directed by the Engineer.

Coatings must be allowed to cure before being recoated or placed into service. Drying time requirements recommended by the manufacturer should be followed exactly.

The final colors shall be as noted on the color schedule.

Coverage shall be complete. When color on undercoats shows through the final coat of paint, the work shall be covered by additional coats until the paint is of uniform color and appearance and coverage is complete, at no additional cost.

Rooms or areas being painted shall be supplied with sufficient temporary ventilation during painting operations to keep the atmosphere safe from harmful or dangerous fumes and harmful dust levels for personnel.

All application tools and equipment shall be in good working order and suitable for proper applications. It shall be the Contractor's responsibility to ensure that no paint mist or spatter falls or blows to other objects, vehicles, equipment, buildings, etc.

Coating Schedule:

All painting shall be in accordance with the following schedule. The number of coats shall not be less than the number shown on the schedule.

COATING SCHEDULE					
			Coats		
Surfaces	**SHOP COAT**	**Primer**	**1ST**	**2ND**	**3RD**
Aluminum	A		B	C	
Electrical Conduit	A		B	C	
Steel Pipe, Valves, and Fittings	A		B	C	
Galvanized Steel	A		B	C	
Ductile Iron Pipe, Valves, and Fittings	A		B	C	
Miscellaneous Steel and Ironwork	A		B	C	
Machinery, Interior, and Nonsubmerged		A	B	C	
Exterior Concrete or Masonry		D	E	E	

The designations in the following list are given solely for the purpose of indicating the type and quality of materials desired. Approved equivalent material of other manufacturers may be substituted. All coats of paint for any particular surface shall be from the same manufacturer.

ALPHABETICAL DESIGNATIONS OF PRODUCTS		
Symbol	**Product Name and Number**	**Minimum Dry Film Thickness Mils per Coat**
A	Tnemec N-140 Pota Pox Epoxy	4.0 – 6.0
B	Tnemec Series 446 Perma-Shield	5.0 - 7.0

C	(Above Grade) Tnemec 1074U Endurashield (Below Grade) Tnemec Series 446 Perma-Shield	4.0 - 6.0 5.0 – 7.0
D	Porter Acri-Pro 100, 100% Acrylic	1.2
E	Porter Acri-Shield, 100% Acrylic	1.4

W-36.05 Safety

The Contractor shall be responsible for exercising all necessary precautions to ensure that no accidents or damage to personnel, equipment, or buildings shall occur. The Contractor shall further determine any special operations which could influence the safe workmanship of his personnel with respect to electrical, mechanical, or chemical fumes or fire hazard situations.

When painting in confined areas or otherwise in areas where explosive fumes or gases need to be ventilated, the Contractor shall use suction type fans designated specifically for the safe removal of explosive fumes or gases, and all equipment involved shall meet all OSHA (Occupational Safety Hazard Act) requirements and MSHA (Mine Safety and Health Administration) approved. The Contractor shall be responsible in all respects for the safe conduct of his personnel when using any of the rigging or equipment involved in the accomplishment of the work specified herein.

W-36.06 Cleaning

The Contractor shall touch up and restore any damaged finish. Paint or other finishes spilled, splashed, or splattered shall be removed from all surfaces. Care shall be taken not to mar any surface finish or item being cleaned.

* * *

SECTION 45 - ELECTRICAL

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The work in this section consists of furnishing all labor, materials, equipment and transportation, and performing all operations required to support the installation and commissioning of the electrical portion of the proposed Wastewater Pumping Station Rehabilitations including, but not limited to, the following:

1. Submit working drawings, parts schedules, and cut-sheets to the Engineer.

2. Furnish and install all electrical equipment, controls, and instrumentation as shown on the Plans and described in the Specifications. Refer to the Plans for the Scope of Work.

1.02 GENERAL REQUIREMENTS

A. Codes

Any conflicts between the Specifications and Drawings or with the regulations of local codes, public utility company, or the National Electrical Code or the National Electrical Safety Code shall be promptly brought to the attention of the Engineer for clarification. All materials and work shall be in accordance with said standards.

B. Contract Documents

The drawings are generally diagrammatic not necessarily showing in detail all of the minor items and it shall not be interpreted to mean that any minor item required may be omitted. The Contractor shall make use of all the data in all of the Contract Documents and shall verify all information at the site, which may influence his proposal. The Contractor shall obtain all necessary shop drawings and shall consult manufacturer's representatives during installation start-up as needed.

C. Tests

The Contractor shall provide all necessary instruments and special apparatus to conduct any test that may be required to ensure that the system is free of all improper grounds and short circuits. These tests shall be conducted in the

presence of the Engineer prior to final acceptance.

D. Guarantee

The Contractor shall submit a written guarantee to the City that all electrical work and material provided under this Contract is free from defects for a period of one year after final acceptance of the job. There will be no additional charge to the City to repair or replace any such work, which is found to be defective within the guarantee period.

E. Materials and Equipment

All materials and equipment shall be new and shall bear the manufacturer's name, date of manufacture, trade name, and the UL label. Equipment and materials shall be delivered to the site and stored in original containers, suitably sheltered from the elements, but readily accessible for inspection.

F. Operation and Maintenance Manuals

See Specific Provisions section of the Specifications.

G. Test Documentation

Test all equipment and document tests.

PART 2 – PRODUCTS

PART 3 – EXECUTION

PART 3 EXECUTION OF WORK

A. All work shall be executed in a neat and workmanlike manner by experienced and capable electricians so as to present a neat installation upon completion.

B. Electrical work shall be coordinated so as not to interfere with or delay other construction operations.

C. Equipment front elevations shown on the Drawings are diagrammatic and not to scale. It is the Contractor’s responsibility to verify all dimensions in the field and

make any adjustments necessary to ensure a complete and fully functional installation.

D. The ends of all conduits shall be carefully reamed free from burrs after threading and before installation. All cuts shall be made square. All joints shall be made up tight. Care shall be taken to see that all control and power conduits are grounded as required by the 2020 NEC and Chapter 5 of the City of Tampa Code, Building and Construction Regulations.

SECTION 45.1 - POWER SYSTEM STUDY

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide a Power System Study for the new electrical power distribution and motor control equipment. The study shall be a totally independent effort to verify adequacy of all of the existing equipment as well as new additions being implemented under these Specifications. The study shall be prepared by a professional engineer, registered in the State of Florida, with demonstrated experience in the performance of industrial power system analysis. The Engineer may be an employee of an equipment manufacturer or supplier.

B. Provide all data necessary to perform the study. This includes feeder cable sizes, approximate feeder length motor data, protective relay settings and any other information relevant to the study including existing data for the alternate source.

C. A summary of the short circuit analysis shall be provided at the time shop drawings for all of the new equipment is submitted for approval.

D. All equipment rated 50 volts and higher shall be incorporated in the Study.

E. Provide the services of a field services organization to adjust, set, calibrate, and test all protective devices in the electrical system. The organization shall be a subsidiary of or have a franchise service agreement with the electrical equipment manufacturer. The qualifications of the organization and resumes of the technicians as well as all data forms to be used for the field testing shall be submitted.

F. The short circuit study shall be in accordance with ANSI Standard C37.010 and C37.13, shall be performed to check the adequacy, and to verify the correct application of circuit protective devices and other system components specified. The study shall address the case when the system is being powered from the normal source as well as from the on-site generating facilities. Minimum as well as maximum possible fault conditions shall be adequately covered in the study.

G. Fault contribution of all motors shall be considered. Obtain all required data for equipment. All back-up calculations shall become part of the final report. The calculations shall be in sufficient detail to allow easy review.

H. The flash arc analysis study shall include the calculations of flash protection boundary limits and the incident energy exposure for the maximum arc producing flash expected from the electrical equipment. The study will determine incident energy exposure level and flash arc protection boundaries for the electrical equipment.

I. The Arc Flash study shall be in accordance with the calculations and procedure outlined in IEEE Standard 1584-2018 edition, incident energy calculations. Calculations based on IEEE 1584-2002 will not be considered. NFPA 70E PPE Category method will not be considered.

J. The study shall be based on the protective device settings and interrupting device clearing time.

1.02 CONTENTS

A. The study shall include representation of the power company's system, the base quantities selected, impedance source-data, calculation methods and tabulations, one-line and impedance diagrams, conclusions, and recommendations. Short-circuit momentary duties, shall be calculated on the basis of an assumed bolted three-phase short circuit at the 480-volt switchboard bus, 480-volt MCCs, panelboards, pertinent branch circuit panelboard, and other significant locations throughout the systems. The short circuit tabulations shall include significant X to R ratios, asymmetry factors, KVA, and symmetrical fault current.

B. A protective device time current coordination study shall be included with coordination plots of key and/or limiting devices, tabulated data, rating, and/or settings selected. The study shall present an engineering balance between the competing objectives of protection and continuity of service for the system specified, taking into account the basic factors of sensitivity, selectivity and speed.

C. Separate plots shall be provided for each mode, "normal," and "alternate,"

operation. Maximum fault values shall be shown in each case. Both power sources shown in one plot will not be accepted.

D. Required settings for breakers and relays shall be maximized to provide the most effective protection possible whether the system is fed from the normal or emergency source.

E. Tabulations indicating recommended set points for all protective devices shall be provided. This shall include the normal as well as the alternate source.

F. Flash Arc study shall include representation of the calculation methods and tabulations, and a one-line drawing of all identifying equipment included in this study. The complete study shall be turned over to the Owner. As part of the study, affix permanent adhesive, UV resistant non-fading labeling indicating the equipment ID number and required information as required by NFPA 70E.

G. NOTE: At any location where the Incident Energy Level exceeds 40 cal/cm², the text "! WARNING" shall be replaced with the following text – "DANGER! – TURN OFF POWER FOR MAINTENANCE – THERE IS NO SUITABLE PPE FOR THIS EQUIPENT"

H. Motor Current-Time Characteristic Curves:

1. A complete independent set of current-time characteristic curves for all medium voltage motor drives indicating coordination between the protective relays and the thermal characteristics of the motor shall be provided.

2. Obtain, from the motor supplier, the necessary information to perform the study. Certified curves for, "Safe time vs. current at 100 percent voltage," and "Accelerating time vs. current at 100 percent voltage," shall become part of the final report.

I. Motor Starting Study:

1. A motor starting study for all large electric drives to determine voltage dip or power inrush limitations at selected locations due to starting of motors

shall be provided. This applies to both the normal and the emergency mode.

J. General Information for Time-Current Curves Presentation:

1. The coordination plots shall include complete titles, representative one-line diagrams, legends, associated power company's relay or system characteristics, significant motor starting characteristics, complete parameters for power, and substation transformers, and complete operating bands for low-voltage circuit breaker trip devices.

2. The coordination plots shall define the types of protective devices selected, together with the proposed coil taps, time-dial settings and pickup settings required.

3. The short-time region shall indicate the medium voltage relay instantaneous elements, the magnetizing in-rush, and ANSI withstand transformer parameters, the low-voltage circuit breaker instantaneous trip devices, fuse manufacturing to tolerance bands, and significant symmetrical and asymmetrical fault currents.

4. Each primary protective device required for a delta-to-wye connected transformer shall be selected so that the characteristic or operating band is within the transformer parameters; which, where feasible, shall include a parameter equivalent to 58 percent of the ANSI withstand point to afford protection for secondary line-to-ground faults.

5. Low-voltage power circuit breakers shall be separated from each other and the associated primary protective device, where feasible, by a 16 percent current margin for coordination and protection in the event of secondary line-to-line faults.

6. Protective relays shall be separated, where feasible, by a 0.3 second time margin when the maximum three-phase fault flows, to assure proper selectivity.

K. The power system study shall be bound in a standard 8 1/2" x 11" size report. The

completed short circuit and coordination study shall be submitted and approved before any of the equipment is shipped.

L. All protective devices shall be adjusted, tested, and calibrated in the field, prior to energizing the equipment, per the settings listed in the study. This work shall be performed by the manufacturer as described in this section and prior to final acceptance by the Owner.

M. All protective devices, existing and new shall be calibrated and tested as recommended by and under the supervision of the distribution gear manufacturer's representative as specified in this section. Coordination study engineer shall review and certify that all 'As-Left' settings have been implemented to their recommendations and include certified documentation (signed & sealed letter sufficient) into the final report.

N. The coordination study shall be stamped and signed by a professional engineer registered in the state of Florida.

O. Provide and install arc flash warning labels at all equipment rated 50 volts and larger. Outdoor equipment shall have UV rated equipment labels.

SECTION 46.1
PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS)
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The overall system general requirements are given in this section. These requirements apply to each additional section of these specifications as noted herein and as specified in the associated sections.

B. Work includes engineering, furnishing, installing, testing, documenting and placing in operation the complete Process Instrumentation and Control System (PICS). Training of the OWNER's personnel is also included. The work is specified in this Section and as further specified in the following sections:

1. Specification Section 46.2: Field Instruments.
2. Specification Section 46.3: Control Panels.
3. Specification Section 46.4: Fiber Optic System.

C. All work covered herein shall be performed by one of the following firms henceforth referred to as the SYSTEM SUPPLIER:

1. Star Controls
2. Revere Controls
3. Automated Controls
4. Approved equal.

D. The SYSTEM SUPPLIER shall furnish all labor, materials, equipment, programming, services and incidentals required to install and place into operation a digital computer-based PICS configured as shown on the Contract Drawings, and as specified herein.

E. The SYSTEM SUPPLIER shall provide all equipment, materials, programming, software, modifications to existing equipment, calibrations and services that are required to successfully interface and interconnect the PICS and any other control systems and associated equipment that are specified or designated in any drawings or provisions of these specifications for the purpose of providing a fully integrated and functional control system.

F. The SYSTEM SUPPLIER may duplicate software logic code and database and graphics applications, as required, while still meeting the functional specifications. The ENGINEER may require modifications to the submitted graphics, reports and control logic without change to the contract price. All engineering development required by the SYSTEM SUPPLIER will be in accordance with the Conditions of this Contract.

G. It is the intent of these Contract Documents that the SYSTEM SUPPLIER be retained by the CONTRACTOR to have overall responsibility for designing, furnishing, interfacing, adjusting, testing, documenting, and starting-up the various PICS equipment described in the Contract Documents. The specified intent is that the SYSTEM SUPPLIER will have overall responsibility for making sure the various systems, trades, suppliers, vendors, subcontractors, etc. come together as a complete coordinated system which will reliably perform the specified functions.

H. The CONTRACTOR shall ensure that the SYSTEM SUPPLIER coordinates closely with suppliers of other specialty equipment to ensure the required inputs and outputs for the PICS are available.

I. Instrumentation and control systems for this project are intended to be supplied completely under this section. All control panels shall be supplied through the SYSTEM SUPPLIER; however, some special control panels and devices specifically called out in other specification sections are to be part of those sections, furnished with that equipment. The instruments and controls shall, however, be furnished in conformance to and in coordination with, this section.

J. Division of Work. It is the ultimate responsibility of the CONTRACTOR to furnish a complete and fully operable PICS that reliably performs the specified functions. The CONTRACTOR is to assume full responsibility for additional costs which may result from unauthorized deviations from the specifications. The CONTRACTOR is to establish the actual division of work with the minimum requirements as specified herein

K. The SYSTEM SUPPLIER shall be responsible for:

1. The integration of the system shall include updating the StaRTU software to the latest version, network panel layouts and wiring, network communications programming, integration of fiber-based communication with 4G cellular backup, integration of new field equipment, integration of a back-up pump controller, and SCADA system application software modifications.

2. All hardware and software submittals. The SYSTEM SUPPLIER shall develop the panel shop drawings, wiring diagrams, plumbing diagrams, PLC hardware

configuration drawings and layouts, software documentation, and all other submittals defined herein and in the specification sections identified in paragraph 1.01B hereof. Coordination with the CONTRACTOR and other subcontractors shall be the responsibility of the SYSTEM SUPPLIER.

3. The final system operation and reliability. All required tests and training shall be under the on-site supervision of the SYSTEM SUPPLIER.

4. Ordering, fabrication, assembly, delivery and start-up of the PICS. All panel fabrication defined in Specification Section 40 90 15 shall be performed at the SYSTEM SUPPLIER's shop.

5. Obtaining from the CONTRACTOR the required information on those field elements, equipment starters, valve actuators, chemical feed equipment, local control panels, and other control equipment or devices that are required to be interfaced with, but that are not provided with the PICS in order to provide full system coordination regarding interface, function, testing, and adjustment requirements.

6. Providing accessory devices including furnishing and installation of networking interface cards, interposing relays, control switches and signal converters necessary to perform the intent as described by the control strategies and services necessary to achieve a fully integrated and operational system as shown on the Contract Drawings and defined in the Specifications.

7. Coordinating all interface requirements with mechanical and electrical system suppliers and furnishing any signal isolation devices that might be required In order to insure compatibility between all equipment.

8. Providing any special manufacturer's cables required.

9. Defining the final installation and connection requirements of the PICS at the jobsite through development of interconnection diagrams.

10. Termination and final test of fiber optic cabling, installed by others but terminating within control panels supplied hereunder.

11. Verifying correctness of all final power and signal connections to the PICS. The SYSTEM SUPPLIER shall make final adjustments to and calibrate all field elements provided with the PICS.

12. Ensuring that:

    a. All components provided under this section are properly installed.

b. The proper type, size and number of control wires with their conduits and junction boxes are provided and installed.

c. Proper electric power circuits are provided for all components and systems.

L. The CONTRACTOR shall be responsible for:

1. Including within the electrical subcontractor's scope:

a. Installation of fiber optic cabling furnished by the SYSTEM SUPPLIER. Termination within SYSTEM SUPPLIER provided control panels and enclosures shall be performed by the SYSTEM SUPPLIER. The SYSTEM SUPPLIER shall make all other necessary fiber terminations.

b. Provision, installation and termination of field and power wiring to PICS supplied control panels and field elements. Termination shall be made in accordance with final accepted interconnection diagrams developed by the SYSTEM SUPPLIER. The electrical subcontractor shall mark on the interconnect diagram the field wire numbers used for each termination point. The SYSTEM SUPPLIER shall finalize the interconnect diagrams by including these field wire numbers in the final as built version.

c. Installation and termination of all specialty cables furnished by the SYSTEM SUPPLIER.

2. Including within the mechanical subcontractor’s scope installation of any in-line instrumentation. Installation shall be made in accordance with the manufacturer’s recommendations and under the direction of the SYSTEM SUPPLIER.

3. Equipment storage and protection until installed following the storage and handling instructions recommended by the SYSTEM SUPPLIER. Anti-static and winterization requirements shall be per the SYSTEM SUPPLIER's instructions and the SYSTEM SUPPLIER shall periodically verify that these instructions are followed.

4. Incorporating all necessary components into the system. Schedules included in the referenced specification sections do not necessarily indicate the complete component requirements of the PICS.

5. Ensuring that the SYSTEM SUPPLIER coordinates work with other Divisions and Sections of the Specifications.

6. Requiring the SYSTEM SUPPLIER to observe and advise on the installation of equipment furnished by SYSTEM SUPPLIER and installed by CONTRACTOR to the extent required to certify, with the operational check-out tests, that the equipment will perform as required.

7. Ensuring that information on equipment provided under other Divisions and needed by the SYSTEM SUPPLIER to coordinate the PICS is provided in a timely manner.

M. Equipment found to be defective prior to system acceptance shall be replaced and installed at no additional cost to the OWNER.

N. In the bid price, the SYSTEM SUPPLIER shall provide for obtaining the services of authorized field personnel from the manufacturers of specialty instruments and from the suppliers of application software packages as necessary. Should these personnel be required during installation, start-up and checkout of the respective portions of the PICS, such services shall be provided at no additional cost to the OWNER.

O. The SYSTEM SUPPLIER shall be fully responsible for furnishing all labor, materials, programming, software, licenses, configuration, testing, and documentation required to upgrade the existing PLC system to the latest manufacturer-supported version (StaRTU). This shall include, but not be limited to, migration of all existing PLC programs, validation of all control logic, and modification of code as necessary to ensure full functionality and compatibility with upgraded hardware and software platforms.

P. The SYSTEM SUPPLIER shall also upgrade, configure, and commission all required communication systems, including network infrastructure, protocols, and interfaces, to ensure reliable, secure, and fully functional data exchange between all PLCs and the Owner’s SCADA system.

Q. The SYSTEM SUPPLIER shall integrate all PLC data, alarms, statuses, and control points into the Owner’s existing SCADA system in accordance with the Contract Documents. This integration shall include all necessary PLC programming, tag mapping, database configuration, and SCADA development required to achieve a complete and operational system. No additional compensation shall be provided for work required to achieve full integration.

R. All work shall be completed such that the upgraded PLC and communication systems are fully functional, tested, and ready for operation at the completion of the Factory Acceptance Test (FAT) and System Acceptance Test (SAT). The SYSTEM SUPPLIER shall

be responsible for resolving all deficiencies identified during testing at no additional cost to the Owner.

1.02 RELATED WORK

A. Division 26 - Electrical. All conduits are provided and installed under Division 26, Electrical. With the exception of certain specified special manufacturer's cables, all wiring and cables are provided and installed under Division 26, Electrical.

B. Installation of all mechanical piping and fittings, as well as in-line instruments supplied with and/or supplied for the PICS is performed under other Divisions of these specifications.

C. Field devices such as motorized valves, pump motors, solenoid valves, etc. and local control panels for specialized subsystems such as chemical feed systems, etc. are supplied and installed under other Divisions of these Specifications.

1.03 SYSTEM DESCRIPTION

A. The PICS shall comprise the following major elements:

1. A Human Machine Interface (HMI) subsystem.

2. A Motorola ACE3600 Remote Terminal Unit (RTU) mounted within an enclosure located in the Electrical Building, if applicable, or on-site.

3. A fiber optic-based network to be used as the primary means of communication to the SCADA network interconnecting all of the above elements.

4. Cellular-based communication shall be used as a backup to the fiber network communicating to the SCADA system. The device shall be an industrial-grade, DIN-rail mountable firewall and router designed for harsh environments, supporting Layer 3 routing and 5G cellular networks. Rack-mounted enterprise hardware is strictly prohibited. Manufacturer/Model: Fortinet FortiGate Rugged 50G-5G, or approved equal.

5. Antenna: Provide compatible 5G ruggedized cellular antennas as recommended by the firewall manufacturer to support the selected cellular carrier (e.g., Verizon FrontLine).

B. The HMI subsystem shall comprise the following:

1. A Network Interface Panel (NIP) containing a mixed media Ethernet switch and fiber optic patch panel all powered from an Uninterruptible Power Supply (UPS).

2. All HMI subsystem equipment are interconnected by the Ethernet switch in the NIP, which also forms the connection between the HMI subsystem and the rest of the PICS via the fiber optic network.

1.04 SYSTEM INTEGRATION PLAN

A. Following the System Inspection Report, and prior to any other shop drawing submittals the SYSTEM SUPPLIER shall submit a System Integration Plan (SIP).

B. The SIP shall identify, and provide details of, all new and modified PICS functions. This shall include the following elements:

1. Field.

2. PLC.

3. System Inputs and Outputs.

4. Network/communications.

C. Field. Provide an Excel spreadsheet that covers all field instruments. For each instrument define the following:

1. Tag Number.

2. Instrument Type.

3. Specification Section supplied under.

4. Signal Type.

5. Range or On/Off states as applicable.

D. PLC. Provide an Excel spreadsheet that covers all new or modified PLC. For each, define the following:

1. PLC Designation Number.

2. Location.

3. New or modified.

4. A list of I/O modules (existing and new individually identified) that will exist at project completion.

E. System Inputs and Outputs (I/O). Provide an Excel spreadsheet that lists all system I/O for the complete PICS. For each point, the list shall include the following:

1. PICS database tag number.
2. Signal Description.
3. I/O Type.
4. Range or On/Off state as applicable.

F. Network/communications. This shall provide a tabular listing identifying the following:

1. Ethernet switches listed by port and including spares.
2. Connected equipment to each port.
3. IP addresses of all network connected equipment. Provide a blank column for IP addresses to be completed in the final SIP if not yet assigned.

G. Following PLC programming, revise the system I/O spreadsheet to include all pseudo points (differentiated from physical I/O) that are used by the HMI.

H. Provide a fully updated SIP as part of the final system documentation.

1.05 SUBMITTALS

A. Furnish, as prescribed under the General Requirements, all required submittals covering the items included under this section and its associated sections of the work.

B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities.

C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the Engineer as not approved.

D. All submitted component data sheets shall be marked to specifically identify the model/part numbers to be furnished.

E. Provide all shop drawing submittals on thumb drive in PDF format.

F. In addition to the shop drawing submittals required in the related specification sections, submit the submittals defined below covering the complete system.

1. System Performance. This submittal shall be a written description of how the operator will control the system and the system's subsequent response. Every

piece of controllable equipment shall be separately described and the following information included:

a. Use of local manual controls.
b. Use of HMI software controls.
c. Use of automatic controls.

2. Each functional description shall specifically identify any interlocks (hardware and software) and HMI alarms generated.

3. Field Acceptance Test Plan. This submittal shall define the steps to be conducted during the required witnessed acceptance testing. The test shall be conducted in accordance with the general requirements set forth in Part 3 hereof. The submitted plan shall meet the following requirements:

a. Each of the equipment covered in the system performance submittal shall be tested.
b. For each equipment test, the required operator control actions and system response shall be demonstrated on the complete system, including each operator action, the response and appropriate HMI display/alarm updates.

G. The Contractor and System Supplier are hereby specifically advised that the above submittals shall be Approved or Approved As Noted prior to any witnessed performance testing.

H. Loop Diagram Submittal. This submittal may be made in conjunction with the submittals required under related specification sections. Loop diagrams, consisting of complete wiring and/or plumbing diagrams for each control loop showing all terminal numbers, the location of the dc power supply, the location of any booster relays or common dropping resistors, surge arrestors, etc. The loop diagrams shall be divided into four areas for identification of element locations: PICS I/O point(s), panel face, back-of-panel, and field, respectively.

I. Test Procedures: Submit the procedures proposed to be followed during all required testing. Procedures shall include test descriptions, forms, and check lists to be used to control and document the required tests.

J. Test Reports: Upon completion of each required test, document the test by submitting a copy of the signed off test procedures to the Engineer.

1.06 FINAL DOCUMENTATION

A. After the demonstration tests have been completed and as a part of the final acceptance requirements, submit the PICS record drawings. Record drawings shall include, corrected for any changes that may have been made up through Substantial Completion:

1. System block diagram.
2. Network architecture diagram.
3. Instrument loop wiring diagrams.
4. Panel wiring diagrams.
5. Panel elevations.
6. Interconnection diagrams showing terminal numbers at each wiring termination.

B. Record drawings shall be developed or converted to AutoCAD Version 2013. Provide two copies of all AutoCAD files on separate Compact Disks.

C. Operating and Maintenance (O&M) Manuals: Provide the specified number of complete sets of three-ring bound O&M manuals in accordance with Division 1. Provide separate manuals for each Specification Section, clearly marked. Include descriptive material, drawings, and figures bound in appropriate places. Include:

1. Cross references to 3rd party O&M manuals.
2. Additional operating and maintenance instructions in sufficient detail to facilitate the operation, removal, installation, adjustment, calibration and maintenance of each component provided with the PICS.
3. Internal wiring diagrams (not already shown on the panel wiring diagram record drawings) for all components provided in the PICS that clearly show all terminal block number designations and wire numbers.
4. Bill of Materials identifying the manufacturer and complete part number of all components.
5. All the submittal data for each component from the approved shop drawing submittals with corrections made on approved as noted items.
6. A Compact Disk containing the shop drawing data in PDF format in the binder sleeve.

D. Provide a final System Integration Plan.

E. Refer to the individual specification sections of the PICS for final documentation requirements that are in addition to the above.

1.07 QUALITY CONTROL

A. Base bids for the SYSTEM SUPPLIER shall be as listed in the Contract Proposal. SYSTEM SUPPLIERs seeking ENGINEER approval shall have extensive experience in systems of similar size and complexity. Panel fabrication shop shall be a UL listed panel shop. Acceptance of alternates shall be made based on price, location of the fabrication shop, accessibility of personnel, PLC programming knowledge, and OWNER confidence. The SYSTEM SUPPLIER shall be subcontracted by and paid by the CONTRACTOR.

B. The SYSTEM SUPPLIER shall meet all of the requirements of these specifications, and, unless specifically stated otherwise, no prior acceptance of any subsystem, equipment, or materials has been made.

C. All equipment furnished by the SYSTEM SUPPLIER shall be of the latest and most recent design and shall have overall accuracy as guaranteed by the manufacturer.

D. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

E. Component equipment shall be as supplied by one of the manufacturers named in the individual specification sections or approved equal. The design of the PICS is based on the first-named manufacturer's equipment if there is a difference.

F. To facilitate the OWNER's operation and maintenance, products shall be of the same major manufacturer, with panel mounted devices of the same type and model as far as possible.

G. In order to insure the interchangeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems, and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained.

H. The SYSTEM SUPPLIER shall designate a single point of contact for interface with the ENGINEER on this project. The ENGINEER reserves the sole right to approve or reject this point of contact.

I. The SYSTEM SUPPLIER's selected project personnel shall meet the following requirements:

1. Project engineer shall have at least 10 years' experience in installing similar systems and shall have a minimum of secondary education in the field of electronics or similar technical discipline.

2. Project technician assisting the project engineer for field element calibration and check out shall have at least five years experience in installing similar systems.

3. Key staff resumes shall be submitted for ENGINEER's approval with the Project Plan as further detailed under submittals.

J. Service Facility: The SYSTEM SUPPLIER shall have an established service facility from which qualified technical service personnel and parts may be dispatched upon call. Such a service facility shall be no more than six (6) hours travel time from the jobsite.

K. The SYSTEM SUPPLIER shall provide experienced personnel on-site to coordinate and/or perform installation, termination, and adjustment; on-site testing; OWNER training; and startup assistance for the PICS.

L. The SYSTEM SUPPLIER shall provide, on-site, an experienced project engineer to supervise and coordinate all of the on-site PICS activities. An experienced technician may be provided to assist the project engineer in field element installation, field calibration, and checkout tests. The SYSTEM SUPPLIER's project engineer shall be on-site during the period required to effect all of the critical on-site activities related to the PICS, particularly the software debugging, PICS training, and witnessed testing activities.

1.08 STANDARDS

A. The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.

B. Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment famished has been manufactured in accordance with the National Electric Code and OSHA requirements.

C. Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the OWNER.

D. International Society of Automation (ISA) and National Electrical Manufacturers Association (NEMA) standards shall be used where applicable in the design of the PICS.

E. All equipment used on this project to test and calibrate the installed equipment shall be in calibration at the time of use. Calibration shall be traceable to National Institute of Standards (NIS - formally NBS) calibration standards.

F. For the purposes of uniformity and conformance to industry standard, provide analog signal transmission modes of electronic 4-20 ma DC. No other signal characteristics are acceptable.

G. Discrete signals are two-state logic signals. Use 120V ac sources on all discrete signals unless otherwise noted or shown.

H. Provide appropriately sized electrical transient protection devices for all electrical elements of the system as further defined in the individual specification sections. For field mounted devices, provide protector enclosures to the electrical Subcontractor for mounting and installation.

1.09 WARRANTY AND GUARANTEES

A. In accordance with Division 1, the SYSTEM SUPPLIER shall furnish to the OWNER a written two year guarantee commencing with final acceptance, that all equipment and parts thereof, material and/or workmanship for the field elements, instruments, and control panels are of top quality and free from defects.

B. The SYSTEM SUPPLIER shall guarantee all equipment whether or not of his own manufacture.

1.10 SPARES AND EXPENDABLES

A. Obtain from the manufacturer(s) and provide the recommended critical spare parts as part of the work. Refer to the individual requirements listed in the associated specification sections for the PICS for specific parts to be provided as a minimum. The spare parts are the property of the OWNER.

B. Obtain from the manufacturer(s) and furnish any special tools, calibration equipment and testing apparatus required for the proper adjustment and maintenance of the material provided.

PART 2 - PRODUCTS (THIS PART NOT USED)

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK

A. Coordination Meetings: In order to ensure timely performance of the Contract and the system's conformance with these specifications, coordination meetings shall be. The first meeting will be held 30 days after award of the Contract to the CONTRACTOR. The CONTRACTOR and SYSTEM SUPPLIER shall provide for their attendance at this meeting in their quotation. A schedule for additional coordination meetings (approximately one each month) will be derived at this initial meeting for periodic update, coordination, and conflict resolution during the project duration.

B. Prerequisite Activities and Lead Times: Do not start the following key project activities until the listed prerequisite activities have been completed and lead times have been satisfied:

1. Hardware Purchasing, Fabrication, and Assembly: Associated design related submittals completed (no exceptions, or approved as noted).
2. Shipment: Completion and approval of all design related submittals.
3. Startup: Operational Checkout Tests.
4. OWNER Training: Owner training completed and O&M manuals delivered.
5. Demonstration Tests: Operational Check-out Tests, Startup, OWNER Training, and Demonstration Test Procedures must be complete. Give 4 weeks' notice prior to the planned test start date.

C. Consoles, Panels, and Panel Mounted Equipment: Consoles, panels, and panel mounted equipment shall be assembled as far as possible at the SYSTEM SUPPLIER's shop. No work, other than correction of minor defects or minor transit damage, shall be done on the panels at the jobsite.

3.02 BACK-UP PUMP CONTROLLER AND FLOAT SWITCH

A. The Back-Up Pump Controller shall be designed to run one or two pumps for a fixed time interval, set by the user, when the primary wet well level controls fail. The unit shall monitor a backup level alarm in the wet well and start up to two pumps when the high alarm float switch closes. When the high-level float switch closes, the back-up unit closes a relay that starts Pump #1 and starts an internal Timer #1. When Timer #1 reaches its set time, and the level-alarm float switch is still closed, Pump #2 is started. Pump #1 and

Pump #2 will run until the level-alarm float switch opens. When the level-alarm float switch opens, Timer #2 is started and both pumps continue to run until Timer #2 reaches its set time.

1. The Back-Up Pump Controller shall be Wilkerson model DR1920, or equal.

3.03 PAYMENTS

A. General: All work provided under this Section and its associated Sections for the PICS shall be paid for in accordance with the approved payment Schedule of Values submitted by the CONTRACTOR. The approved Schedule of Values will be the basis for partial payment for work provided for the PICS.

B. Partial Payment for Work Completed: The breakdown in the Schedule of Values allows for the partial payment of work completed for the PICS. Before partial payment is considered for approval, each specific activity must be completed.

C. Substantial Completion: Substantial Completion for the project is as defined in the General Conditions. However, the following requirements must be fulfilled before consideration will be given for Substantial Completion of the PICS:

1. All PICS submittals have been completed.
2. The PICS has successfully completed the Demonstration Tests.
3. The required Owner training has been implemented.
4. All spares, expendables, and test equipment have been received by OWNER.

D. Final Acceptance: PICS final acceptance is defined as the date when the ENGINEER issues a written notice of final acceptance. For this Section, the following must have been completed before consideration will be given to the issuance of notice of final acceptance:

1. All punch-list items have been checked off.
2. Revisions to the PICS O&M Manuals have been made (that may have resulted from the Demonstration Tests).

E. Partial Payment Limits: The partial payments for work provided for the PICS shall satisfy the following limiting maximum criteria (percentages of the lump sum pay item for the PICS):

1. Submittals (not including O&M Manuals) 15%
2. Training 5%
3. O&M Manuals 5%

4. Demonstration Tests 10%

3.04 PRODUCT HANDLING

A. Store and protect equipment until installation following the storage and handling instructions recommended by the equipment manufacturers. Place special emphasis on proper anti-static protection of sensitive equipment.

B. Protection During Construction: Throughout this Contract, provide protection for materials and equipment against loss or damage and from the effects of weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Provide covers for panels and other elements that may be exposed to dusty construction environments. Specific storage requirements shall be in accordance with the SYSTEM SUPPLIER's recommendations.

C. Corrosion Protection: Protect all consoles, panels, enclosures, and other equipment containing electrical or instrumentation and control devices, including spare parts, from corrosion through the use of corrosion-inhibiting vapor capsules. Prior to shipment, include capsules in the shipping containers, and equipment as recommended by the capsule manufacturer. During the construction period, periodically replace the capsules in accordance with the capsule manufacturer's recommendations. Replace all capsules just prior to Final Acceptance.

D. ESD Protection: Provide for the proper handling, storage, and environmental conditions required for the PICS components deemed static sensitive by the equipment manufacturer. Utilize anti-stat wrist straps and matting during installation of these items to prevent component degradation. Flooring used in control areas shall be reviewed and approved by the SYSTEM SUPPLIER.

E. Adequately pack manufactured material to prevent damage during shipping, handling, storage and erection. Pack all material shipped to the project site in a container properly marked for identification. Use blocks and padding to prevent movement.

F. Ship materials that must be handled with the aid of mechanical tools in wood-framed crates.

G. Ship all materials to the project site with at least one layer of plastic wrapping or other approved means to make it weatherproof. Anti-stat protection shall be provided for all sensitive equipment.

H. Inspect the material prior to removing it from the carrier. Do not unwrap equipment until it is ready to be installed. If any damage is observed, immediately notify the carrier so that a claim can be made. If no such notice is given, the material shall be assumed to be in undamaged condition, and any subsequent damage that is discovered shall be repaired and replaced at no additional expense to the OWNER.

I. The CONTRACTOR shall be responsible for any damage charges resulting from the handling of the materials.

3.05 INSTALLATION

A. Material and Equipment Installation: Install the PICS in locations indicated on the Drawings and follow manufacturers' installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturers' instruction and these Contract Documents, follow ENGINEER's decision, at no additional cost. Keep copy of manufacturers' instructions on the jobsite available for review at all times.

B. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance. Coordinate I&C work with the OWNER and work of other trades to avoid conflicts, errors, delays, and unnecessary interference with operation of the existing plant during construction.

C. Provide finish on instruments and accessories that protects against corrosion by the elements in the environment in which they are to be installed. Finish both the interior and exterior of enclosures. Provide extra paint of each color used in the material from the manufacturer for touch-up purposes.

D. Equipment Finish: Provide materials and equipment with manufacturer's standard finish system. Provide manufacturer's standard finish color, except where specific color is indicated. If manufacturer has no standard color, finish equipment with light gray color.

E. Cleaning and Touch-up Painting: Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and type of surface of the original finish. Clean and polish the exterior of all panels and enclosures upon the completion of the demonstration tests.

F. Control Valves: Verify correctness of installation. Verify calibration and adjustment of all positioners and I/P transducers and verify correct control action. Verify position switch settings. Verify opening and closing speeds and travel stops.

3.06 SYSTEM OPERATING CRITERIA

A. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two (2) cycles per minute or a magnitude of movement of 0.5 percent full travel.

B. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.

C. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 2 percent of full scale over a 6:1 operating range.

D. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5 percent of full travel regardless of force required to position final element.

E. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0 percent of full scale.

F. Performance: All instruments and control devices shall perform in accordance with manufacturer’s specifications.

3.07 TRAINING

A. The cost of training programs to be conducted with OWNER's personnel shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the System being supplied.

B. The SYSTEM SUPPLIER shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.

C. The SYSTEM SUPPLIER shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to OWNER.

D. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system.

E. All training schedules shall be coordinated with, and at the convenience of the OWNER. Shift training may be required to correspond to the OWNER's working schedule.

F. Specific details of the nature and duration of training to be provided are defined in the individual specification sections.

3.08 TESTING – GENERAL

A. All elements of the PICS, both hardware and software, shall be tested to demonstrate that the total system satisfies all of the requirements of the Contract Documents

B. As a minimum, the testing shall include operational check-out tests, and Witnessed Demonstration Tests.

C. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system producing the correct result (effect), the specific test requirements will have been satisfied.

D. All tests shall be conducted in accordance with, and documented on, prior approved procedures, forms, and checklists. Each specific test to be performed shall be described and a space provided after it for signoff by the appropriate party after its satisfactory completion. Copies of these signoff test procedures, forms, and checklists will constitute the required test documentation.

E. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provide suitable means of simulation. Define these simulation techniques in the test procedures.

F. The SYSTEM SUPPLIER shall coordinate all of their testing with the CONTRACTOR, the ENGINEER, all affected suppliers, and the OWNER.

G. The ENGINEER reserves the right to test or retest any and all specified functions whether or not explicitly stated in the approved test procedures. The ENGINEER's decision shall be final regarding the acceptability and completeness of all testing.

3.09 OPERATIONAL READINESS TEST (ORT)

A. Prior to startup and demonstration testing, certify that the entire installed PICS (inspected, tested and documented) is ready for operation. These inspections and tests shall include Loop/Component inspections and tests. Toward the end of these checkout tests, down load the HMI software and test the system loop by loop to complete the PICS checkout tests. The SYSTEM SUPPLIER shall fully debug problems

in the system as a whole. Final approval of control software will not be based on written descriptions of software functions alone, but on actual performance in the field.

B. Check the entire PICS for proper installation, calibration and adjustment on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and the PICS Specifications.

C. The Loop/Component Inspections and Tests shall be implemented using approved forms and checklists. Example sheets are provided at the end of this Specification Section. These shall be developed by the SYSTEM SUPPLIER and submitted for approval.

D. Maintain the Loop Status Reports and Component Calibration Sheets at the jobsite and make them available to the ENGINEER at any time.

E. Witnessing: These inspections and tests do not require witnessing. However, the ENGINEER will review the Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Check-out Tests. Correct any deficiencies found.

F. Final Documentation: The completed reports and sheets shall be assembled in one document and submitted together with a completed Manufacturer's Check-Out Certification.

3.10 FIELD ACCEPTANCE TEST (FAT)

A. Once the PICS has passed the ORT, the SYSTEM SUPPLIER shall perform a witnessed Field Acceptance Test (FAT) on the complete PICS. The FAT shall demonstrate that the PICS is operating and in compliance with the Contract requirements. Each specified function shall be demonstrated on a paragraph-by-paragraph, and site-by-site basis.

B. Prior to the FAT, the entire installed PICS shall be certified in writing by the CONTRACTOR that it is ready for operation.

C. The system shall operate for a continuous 100 hours without failure before this test will be considered successful.

D. The FAT shall cover the entire PICS, including control functions, alarms, and status monitoring. Test procedures used for factory tests may be adopted for these tests if modified as required.

3.11 30-DAY SYSTEM ACCEPTANCE TEST (SAT)

A. After completion of the Field Acceptance Tests, the entire system shall operate for a period of 30 consecutive days, under conditions of full plant process operation, without a single non-field repairable malfunction.

B. Provide complete O&M Manuals for the PICS at the jobsite at least two weeks prior to the SAT.

C. During this test, plant operating and SYSTEM SUPPLIER personnel shall be present as required. The SYSTEM SUPPLIER is expected to provide personnel for this test who have an intimate knowledge of the hardware and software of the system.

D. While this test is proceeding, the OWNER shall have full use of the system. Only plant operating personnel shall be allowed to operate equipment associated with live plant processes.

E. Any malfunction during the tests shall be analyzed and corrections made by the SYSTEM SUPPLIER. The ENGINEER and/or OWNER will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

F. Any malfunction, during this 30 consecutive day test period, which cannot be corrected within 24 hours of occurrence by the SYSTEM SUPPLIER's personnel, or more than two similar failures of any duration, will be considered as a non-field-repairable malfunction.

G. Upon completion of repairs, by the SYSTEM SUPPLIER, the test shall be repeated as specified herein.

H. In the event of rejection of any part or function, the SYSTEM SUPPLIER shall perform repairs or replacement within 90 days.

I. All data base errors must be corrected prior to the start of each test period. The 30-day test will not be considered successful until all databases are correct.

J. The total availability of the system shall be greater than 99.5 percent during this test period.

1. Availability is given by “(Total Time-Down Time) / Total Time".

2. Down times due to power outages or other factors outside the normal protection devices or back-up power supplies provided, shall not contribute to the availability test times above.

K. Upon successful completion of the 30-day Site Acceptance Test and subsequent review and approval of complete system final documentation, the system shall be considered substantially complete and the warranty period shall commence.

Loop Check-out Sheet

Project	Owner's Project No. (if applicable):	Page of
Project	Regulatory Agency Project No. (if	
HDR Project	Date:	

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	**FIELD**					**CONTROL CAB**	
	LEAK CHECK(1)			TERM/CONT CHECK(2)		TERM/CONT CHECK(2)	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR						
EQUIP STATUS						
ALARM POINT						

OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

AS LEFT SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by:_____ Date:_____

Instrument Calibration Sheet

Project Name:	Owner's Project No. (if
Project Owner:	Regulatory Agency Project No. (if
HDR Project	Date:
Control Loop	

Instrument Tag	Transmitter/gauge
Manufacturer:	Switch set-point:
Model No.	Switch dead band:
Serial No.	Switch range:

TRANSMITTERS AND INDICATORS

	INCREASING INPUT			**DECREASING INPUT**		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%						
25%						
50%						
75%						
100%						
Other (if applicable)						
Other (if applicable)						

SWITCHES

	INCREASING INPUT			**DECREASING INPUT**		
ACTUATION POINT	**INPUT**	**OUTPUT**	**ERROR (% of range)**	**INPUT**	**OUTPUT**	**ERROR (% of range)**
High (Increasing input)						
Low (Decreasing input)						

Maximum allowable error (per Contract Documents):

Remarks: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by:_____ Date Certified:_____

END OF SECTION

SECTION 46.2
PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS)
FIELD INSTRUMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Specification Section covers work related to the various field instruments to be supplied with the Process Instrumentation and Control System (PICS).

B. Field instrumentation as specified herein shall be furnished by the same SYSTEM SUPPLIER furnishing services and equipment as outlined in Section 46.1.

1.02 RELATED WORK

A. Specification Section 46.1 defines work associated with the overall PICS.

B. Specification Section 46.3 defines work associated with control panels and enclosures housing the various elements of the PICS.

C. Provision of all field and power wiring except manufacturer-supplied cables and installation of all such wiring is performed under Section 45, Electrical.

D. Physical Installation of field instruments is performed under other Divisions of these specifications.

1.03 SUBMITTALS

A. Submit the following Field Instrumentation Shop Drawings in a single package:

1. Catalog information, descriptive literature, wiring diagrams, and shop drawings on all components of the field instruments, including all miscellaneous electrical and mechanical devices furnished under this section.

2. Individual data sheets for all components of the field instruments to supplement the above information by citing all specific features for each specific component (e.g. scale range, materials of construction, special options included, etc.). Each component data sheet shall bear the component name and instrument tag number designation shown in the Drawings and Specifications.

3. Installation details for all field mounted devices to show conformance with the Contract Documents.

4. Configuration documentation for all programmable devices to indicate actual settings used to set the device scale, range, trip points, and other control parameters.

5. Proposed tag numbers for each specific instrument.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Equipment to be installed in a hazardous area shall meet Class, Group, and Division classification as shown on the Contract Electrical Drawings, or comply with the local or National Electrical Code, whichever is the most stringent requirement.

B. All instruments requiring plumbing shall utilize stainless steel components as follows:

1. Test Tap: Shall consist of Crawford Fitting Co. Swagelock quick connects Series QC4-DE, or equal.

2. Tubing, Stainless Steel: Shall be ASTM A 312, TP 316, seamless, soft annealed with 0.065 inch wall. Fittings shall be ASTM A 276, TP 316 compression or socket weld type.

3. Valve, Ball: Shall be stainless steel ball valves, Whitey Series 40, Hoke Flamite Series 7100, or equal.

C. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks.

D. Instrument cable lengths shall be determined by the SYSTEM SUPPLIER based on actual field installation requirements.

E. All transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to two percent. Indicator readouts shall be linear in process units.

F. Electronic equipment shall utilize printed circuitry suitably coated to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

2.02 LIGHTNING/SURGE PROTECTION

A. Surge suppressors and arrestors meeting the requirements of IEEE/ANSI Standard C-62.41 (latest revision) shall be provided on all electronic field instruments.

B. AC Powered Instruments. Lightning and surge protection shall be provided on both the AC power supply and signal lines. The instrument, a breaker and the surge suppressor shall be mounted on a ½-inch aluminum plate equipped with 1/8 inch sun shields on top and both sides with front panel facing north wherever practical. The mounting plate shall be connected to a ground rod via a #10 gauge wire. The protectors shall meet the following criteria:

1. NEMA 4X small case.
2. Response time of less than five nanoseconds.
3. AC Power protection: IEEE/ANSI Std. C-62.41 rated C3 at 330 Volts clamping level.
4. Signal line protection: 10,000 Amp 8 x 20 microsecond surge, clamped at 36 Volts clamping level.
5. Test jacks for low level signal monitoring.
6. Manufacturer/model: EDCO SLAC series or approved equal.

C. Loop Powered Instruments. Lightning and surge protection shall be provided on the 4-20 mA DC signal line. The protectors shall meet the following criteria:

1. Encapsulated in Stainless Steel Pipe nipples for in-line conduit mounting.
2. Response time of less than one nanosecond.
3. Capable of withstanding up to 400 occurrences of 500 Amps at 10 x 1 millisecond.
4. Series resistance of 5 ohms per line.
5. Protection of both lines plus shield
6. Manufacturer/model: EDCO SS65 or approved equal

2.03 FIELD INSTRUMENTS

A. Radar Level Element and Transmitter (wetwells). The system shall consist of a sensor (Level Element, LE) that uses a non-contact measurement technique to measure the liquid level in a vessel, tank or basin that produces an analog signal proportional to level.

1. System Performance:

    a. Overall system accuracy shall be plus or minus 0.08 inches.
    b. The unit shall contain programmable functions that allow false echoes from passing equipment are damped out.
    c. The system shall be field calibratable.
    d. Beam Angle: 4 degrees.

2. Power Requirement – Loop powered.

3. Communication Options – Bluetooth, HART (4-20mA)

4. Materials – PVDF cone

5. Installation Requirements – Provide minimum of 6" between top of level transmitter and sunshield.

6. Options:

    a. Provide manufacturer provided hanging bracket.

7. Manufacturer, Model series:

    a. Siemens LR120.
    b. City approved equal.

B. Float Switch. The level switch shall be a direct acting, weighted float suspended on its own cable. As the liquid level rises the float tilts and actuates a hermetically sealed switch inside the float. The cable shall be terminated within a junction box located outside the tank or basin. For multiple float applications, all cables shall terminate in a single junction box.

1. Materials:

    a. Float wetted part – Polypropylene
    b. Cable – PVC jacketed
    c. Junction box – 316 SS

2. Ratings:

    a. Junction box – NEMA 4X
    b. NSF approved for potable water.

3. Electrical:

a. Dry contact rated to 4.5 Amps at 120 VAC
b. Normally open or normally closed as required for the application

4. Options

a. Provide stainless steel hanging bar. Attach the float cables to the bar using Kellum grips.
b. Provide other supports/mounting accessories as required.

5. Manufacturer, model:

a. Anchor Scientific, Roto-float.
b. Approved equal.

C. Fuel level sensor. The system shall consist of a sensor (Level Element, LE) on a probe that measures liquids within a specified range and determines the exact amount of liquid within the confined area providing a continuous analog output. The probe shall use a contact measurement technique to measure the liquid level in a vessel, tank or basin that produces an analog signal proportional to level.

1. System Performance:

a. Overall system accuracy shall be plus or minus 2% of measuring range.
b. The system shall be field calibratable.
c. Measurement resolution shall be within ¼" increments

2. Power Requirement – Loop powered.

3. Material: 316 Stainless Steel

4. Housing: NEMA 4X & Explosion Proof

5. Output: 4-20mA

6. Options:

a. Provide manufacturer provided mounting bracket.

7. Manufacturer, Model series:

a. FPI Sensors, Continuous Level Probe.
b. Approved equal.

D. Flow Switch. The flow switch shall use thermal dispersion and be capable of monitoring low flow rates in gases and viscous fluids. The sensor head employs two temperature sensors with a constant low power heating source attached to one. The other temperature sensor compensates for process temperature changes. The difference in temperature between the two sensors varies with flow. Alternate flow switches to those specified that employ physical deflection to detect flow will not be acceptable except for clean water applications.

1. Performance:

   a. Operating Temperature – 0 to 65 degrees C
   b. Operating pressure – Up to 500 psig
   c. Response time – less than 5 seconds
   d. Adjustable setpoint down to 0.01 feet/second in liquid and 0.1 feet/second in air.

2. Physical:

   a. Spherical Tip.
   b. Insertion length suitable for monitored pipe's diameter. Specifically identify proposed insertion lengths in shop drawing submittal

3. Materials:

   a. Sensor Head – 316L stainless steel.

4. Ratings:

   a. Electrical Class – UL approved explosion proof
   b. Electronic enclosure – NEMA 4X.

5. Electrical:

   a. Power Requirement - 120 VAC plus or minimum 10 percent, 60 Hertz.
   b. Maximum Power Consumption – 5 Watts
   c. Output – DPDT relay contact rated 10 Amps resistive at 120 VAC.

6. Manufacturer, model:

   a. Magnetrol, model TD2
   b. Approved equal

E. Power Monitor. Provide a power monitor, all required hardware, and a MODBUS communication module in the MCC at each site. The Contractor shall coordinate with the MCC manufacturer for installation requirements. The UL certification of the MCC shall be maintained.

1. Manufacturer:

a. Siemens PAC4200
b. Schneider PM8000
c. Approved equal

F. Rainfall Gauge. Provide a rain gauge tipping bucket type sensor with all required mounting hardware that shall be compatible with other components included herein.

1. System Performance and Physical Features

a. Collector Dia.: 6”
b. Calibration Resolution: 0.01”/tip
c. Options:

i. Siphoning Sensor
ii. Bird Repellant Apparatus
iii. Pole Mount Base (where required)
iv. Factory Calibration Certificate

2. Manufacturer/Model:

a. Texas Electronics, Inc., TR525I-S
b. Approved equal

2.04 CERTIFICATIONS

A. CE compliant

B. UL certified

2.05 ENVIRONMENTAL REQUIREMENTS

A. Operational Criteria

1. Operating temperature: 10 to 30 °C ±4 °C deviation (50 to 86 °F ±7.2 °F deviation)

2. Relative humidity: 5 to 95 %, non-condensing

3. Reagent temperature: keep between 10 to 30 °C (50 to 86 °F)

2.06 WARRANTY

A. Warranted from manufacturer defects for two years (Europe) or one year (all other geographies) from date of shipment.

2.07 MAINTENANCE AND SERVICE

A. Unscheduled Maintenance

1. Check and clean the analyzer components, depending on cleanliness of the sample

B. Scheduled Maintenance / preventative

1. Monthly

a. Reagents refill; validation and / or calibration

2. Quarterly

a. Pump tubing replacement

3. Annually

a. Calibration
b. Replacement of all tubing
c. Replacement of valves and pistons

2.08 SPARES AND EXPENDABLES

A. Provide the following spare parts:

1. Ten (10) spare fuses of each type and rating supplied.

2. Two (2) spare surge protection devices of each type used.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install the PICS field instruments in strict accordance with the respective manufacturer's instructions and recommendations, in locations as shown on the Drawings, and as indicated on the installation details of the Drawings.

B. Fully calibrate each instrument.

C. Provide surge protection enclosures to the electrical sub-contractor for mounting and installation. The enclosures shall be fully wired internally. Coordinate grounding requirements with Division 16, Electrical.

3.02 TRAINING

A. A minimum of eight hours of on-site (field) training shall be conducted at the OWNER's plant site and shall provide detailed hands-on instruction to OWNER's personnel covering all supplied field instruments.

B. Training shall include:

1. Calibration procedures.

2. Preventive maintenance methods and timing.

3. Fault-finding techniques.

C. The training shall run at times chosen by the OWNER.

END OF SECTION

SECTION 46.3
PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS)
CONTROL PANELS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Specification Section covers work related to the control panels and enclosures to be supplied with the Process Instrumentation and Control System (PICS).

B. The control panels, as specified herein, shall be furnished by the same SYSTEM SUPPLIER furnishing services and equipment as defined under Specification Section 46.1.

C. The SYSTEM SUPPLIER shall design, furnish and install all interior wiring within the control panels and furnish complete wiring diagrams showing the electrical circuits inside the panel and interconnections between the panel and the external instruments and components.

D. Size control panel(s) to adequately dissipate heat generated by equipment mounted inside or on the panel front face.

1.01 RELATED WORK

A. Specification Section 46.1 defines work associated with the overall PICS,

1.02 SUBMITTALS

A. Submit the following control panel shop drawings in a single package:

1. Layout diagrams for all control panels and enclosures. Include panel elevations (front, side, interior), and sizing. Panel front elevations shall be of sufficient scale to allow all engraved nameplates and inscriptions to be legible without the use of schedules.

2. A complete Bill of Materials for each panel cross-referenced to the panel layout drawings and identifying the manufacturer and complete part number of all components.

3. Wiring diagrams for all control panels. Diagrams shall be complete electrical wiring diagrams showing all components and all auxiliary devices such as relays, alarms, fuses, lights, fans, heaters, etc. All wires and terminals shall be numbered on the diagrams, and line cross-references shall be labeled. Include wiring interface to the PLCs where applicable. Include on these drawings a tag number to identify each component and referenced to a component identification list.

4. Data sheets for all components. The data sheets shall be marked to indicate those portions applicable to the components to be furnished.

5. Power requirements and heat dissipation summary for all control panels. Power requirements shall state required voltages, currents, and phase(s). Heat dissipations shall be maximums and shall be given in Btu/hr. The summary shall be supplemented with calculations.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Equipment to be installed in a hazardous area shall meet Class, Group, and Division classification as shown on the Contract Electrical Drawings, or comply with the local or National Electrical Code, whichever is the most stringent requirement.

B. Electronic equipment shall utilize printed circuitry suitably coated to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

C. All equipment shall be designed to operate on a 60-Hertz alternating current power source at a normal 120 volts, plus or minus 10 percent, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

D. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single MANUFACTURER, insofar as possible, and shall consist of equipment models which are currently in production.

E. The equipment furnished shall be designed to operate satisfactorily between 0 degrees C and 40 degrees C for indoor panels and 50 degrees C for outdoor panels at up to 95 percent Relative Humidity (non condensing).

F. All outdoor panels and enclosures containing electronic or electrical components shall be equipped with sunshields on both sides, the front, and the top with a minimum separation of one inch and one-half inches. Sun shields shall be 14 gauge Stainless Steel or 12 gauge Anodized Aluminum or thicker. Finish with reflective white, two part epoxy coating or reflective, white, polyester powder deposited coating.

G. All outdoor control panels and enclosures shall be equipped with 3 ½" stainless steel mounting uni-struts across the width of the back. For free-standing panels the struts shall be located half-way up the panel and six inches from the top. For other panels they shall be located 3" from the top and 3" from the bottom.

H. All switches shall have double-pole, double-throw contacts rated at a minimum of 600 volts-amperes (VA), unless specifically noted otherwise.

I. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting when power is restored.

J. All discrete inputs entering the panel shall be wetted by 120 VAC. Provide isolation relays if necessary to accommodate this requirement.

K. All discrete output signals shall be equipped with interposing relays to electrically isolate them from the control system I/O.

2.02 LIGHTNING/SURGE SUPPRESSION

A. Surge suppressors and arrestors meeting the requirements of ANSI Standard C-62.41 (latest revision) shall be provided as further detailed below.

1. All spare I/O shall be provided with surge protection. Provide a minimum of 15% spare I/O for each type of signal listed below.

a. Discrete Input
b. Discrete Output
c. Analog Input
d. Analog Output

B. DC Signals. Lightning and surge protection shall be provided on all DC signal wires entering or leaving the panel. The protectors shall meet the following criteria:

1. 35 mm DIN rail mounted with spring terminals.

2. Response time of less than one nanosecond.

3. Operating signal current: up to 0.5 A

4. Capable of withstanding 5,000 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave.

5. Nominal series resistance of less than 2 ohms each leg

6. Manufacturer/model:

a. Dehn DCO RK ME
b. Approved equal.

C. AC Signals. Lightning and surge protectors for all incoming 120 VAC discrete signals lines shall meet the following criteria:

1. Serial protection.

2. Nominal operating voltage: 120 VAC 47/63 Hz.

3. Response time of less than 0.25 nanoseconds.

4. Capable of withstanding up to 40,000 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave.

5. Manufacturer/model:

a. Phoenix Contact 2906840
b. Approved equal.

D. AC Power. Lightning and surge protectors for AC power supply lines up to 15 Amps service shall meet the following criteria:

1. Serial protection with replaceable fuse.
2. Failure indicator.
3. Response time of less than five nanoseconds.
4. Capable of withstanding up to 10,000 Amps at IEEE/ANSI C-62.41 8 by 20 microseconds combination wave.
5. Manufacturer/model:

a. EDCO HSP121BT
b. Approved equal.

E. Single phase AC Power (over 15Amps). Lightning and surge protectors for AC power supply lines over 15 Amps service shall meet the following criteria:

1. Parallel protection using MOVs and thermal fusing technology.
2. Failure indicator
3. Response time of less than five nanoseconds.
4. Capable of withstanding up to 6,500 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave.
5. Manufacturer/model:

a. EDCO FAS-120AC
b. Approved equal.

2.03 CONTROL PANELS AND ENCLOSURES

A. Finish:

1. All front panel openings for panel-mounted equipment shall be cut with counter-boring and provided with trim strips as required to give a neat finished appearance.
2. With the exception of stainless steel panels, all steel panel surfaces shall be treated with phosphatized treatment inside and out, and then finished on the exterior with two coats of baked enamel of the approved color. Interiors of panels shall be white, ANSI No. 51.
3. Stainless steel panels shall be No. 7 polished, 316 stainless steel.

B. Doors:

1. All control panels shall have a continuous piano hinge door for ease of access. A minimum of 80% of the panel interior shall be exposed by doors.

2. NEMA 4X rated panel door openings shall be sealed and fully gasketed.
3. The inside of each door shall be equipped with a print pocket. Provide individually laminated 11x17 sheets for all wiring diagrams.
4. Two-door enclosures shall have a removable center post.
5. Sealed panel doors shall be equipped with quick-release latches.
6. NEMA 1 rated panel doors shall be equipped with a three-point latching mechanism.
7. Where noted or shown on the drawings, doors shall be equipped with a fully gasketed glass window to allow viewing of internally mounted devices without opening the door.

C. All components and terminals shall be accessible without removing other components except for covers.

D. All conduit entry shall be from the bottom only.

E. No components shall be mounted on the interior sides of any panel.

F. All panels shall be provided with an isolated copper grounding bus to ground all signal shield connections.

G. Control Panels containing PICS control system equipment shall each be equipped with an internal, hand-switch controlled, LED light and 120V, 15 amp, duplex utility receptacle.

H. All panels shall be provided with laminated as built electrical wiring diagrams in each panel.

I. Nameplates:

1. All front-face panel mounted controls and indicators shall be equipped with 10-year outdoor-rated adhesive laminated plastic nameplates to completely define their use. Provide Brady Type BBP31 or BBP33 as applicable or approved equal.
2. All internal components shall be equipped with identification tags
3. Each wire shall be uniquely identified and shall be labeled.

J. Power Supplies.

1. Uninterruptible power supplies (UPS) shall be provided in all control panels as follows:

    a. Size the supplies for all internal equipment plus an additional 20% spare capacity.
    b. Provide 15 minutes battery back-up capability at full load.
    c. Provide relay option card for indication of “On UPS Power” and “Low Battery Level”.

d. For outdoor panels provide an UPS and battery rated for operation at up to 50 degrees C.

2. Provide two diode-auctioneered DC power supplies for analog signal use.

3. Provide individually fused DC power for field transmitters.

K. Electrical:

1. Main circuit breaker and branch circuit breaker for each branch circuit as required to distribute power from the main power feed.

2. All breakers accessible when the panel door is open.

3. No more than 20 devices on any single circuit.

4. No more than 12 amps for any branch circuit.

5. Panel (or site) lighting, receptacles, heaters, controls, telemetry and fans on separate branch circuits.

L. Wiring:

1. Power wiring shall be 300 volt, type THWN stranded copper, No. 14 AWG size, for 120V service.

2. Discrete wiring shall be 300-volt type THWN stranded copper, sized for the current carried, but not smaller than No. 16 AWG.

3. Analog signal wiring shall be 300 volt, stranded copper in twisted shield pairs, no smaller than No. 16 AWG.

4. Panel wiring shall be routed within wire troughs or panduits.

5. Hinge wiring shall be secured at each end with the bend portion protected by a plastic sleeve.

6. Analog or dc wiring shall be separated from any ac power or control wiring by at least six inches.

7. Terminal blocks shall be provided for all field wiring entering the panel. The greater of 4 or 15% spare terminal blocks shall be provided.

8. No more than one wire per screw and yoke termination.

M. Construction:

1. Minimum metal thickness: 14-gauge.

2. Stiffeners as required to prevent deflection under instrument loading and permit lifting without racking or distortion.

3. When required, removable lifting rings and fill plugs to replace rings after installation.

N. Miscellaneous Equipment:

1. All panels shall be protected from internal corrosion by the use of corrosion – inhibiting vapor capsules, Northern Instruments Model Zerust VC, Hoffman, model A-HCI, or equal.
2. All sealed panels shall be equipped with combination drain/breathers, Crouse-Hinds model ECD18; or equal.
3. When noted on drawings, panels shall be equipped with thermostatically controlled space heaters to maintain internal temperatures above dew point.

O. All panels shall be manufactured items, Hoffman Engineering, or equal.

2.04 FRONT PANEL DEVICES

A. Potentiometer. Units shall meet the following:

1. Three-terminal potentiometers with a total resistance of 1000 ohms and a power dissipation rating of 2 watts
2. Oil-tight construction, rated NEMA 13
3. Resolution of 1 percent, and linearity of plus or minus 5 percent.
4. Panel mounting accommodating panel thickness between 1/16 to ¼ inch.
5. Legend plates with marking as noted.
6. Allen-Bradley, type 800T, or equal.

B. Selector Switch. Units shall meet the following:

1. Heavy-duty, oil-tight, industrial type selector switches rated for NEMA 4 service.
2. Contacts rated for 120-volt ac service at 10 amperes continuous.
3. Number of positions and contact arrangements as required.
4. Factory-engraved legend plate indicating position definition.
5. Panel mounting accommodating panel thickness between 1/16 to ¼ inch.
6. Black knob type operator.
7. Square D Class 9001, Type K; Allen-Bradley type 800T, or equal.

C. Pushbutton. Units shall meet the following:

1. Heavy-duty, oil-tight, industrial type push buttons rated for NEMA 4 service.
2. Contacts rated for 120-volt ac service at 10 amperes continuous.
3. Number of positions and contact arrangements as required.
4. Factory-engraved legend plate indicating function.
5. Panel mounting accommodating panel thickness between 1/16 to ¼ inch.

6. Operator: Red extended head for STOP, green flush head for START, black flush head for other functions.

7. Square D Class 9001, Type K; Allen-Bradley type 800T, or equal.

D. Indicating Light. Units shall meet the following:

1. Heavy-duty, oil-tight, push-to-test industrial type with integral transformer for 120V AC application.

2. Rated for NEMA 4 service.

3. Screwed on flat-faced lenses in colors shown on the drawings.

4. Factory-engraved legend plates.

5. Square D type K, Allen-Bradley Type 800T, or approved equal.

2.05 INTERNAL PANEL COMPONENTS

A. Control/Interposing Relays: All relays shall meet the following:

1. Compact, general-purpose, plug-in type.

2. Socket mounted.

3. Contacts rated for not less than 10 amperes at 120V.

4. Equipped with neon status lights and test buttons.

5. Permanent, legible identification

6. Potter & Brumfield series KRPA or approved equal.

B. Time Delay Relay. Time delay relays shall meet the following:

1. Available functions: On delay, Off delay, or one shot.

2. Socket mounted.

3. Knob adjustment.

4. Contacts rated for not less than 10 amperes at 120V.

5. Timing range as appropriate for the application.

6. Magnecraft series W211 or approved equal.

C. Terminal Blocks. Terminal blocks shall meet the following requirements:

1. Terminals capable of accepting 10-26 AWG wire.

2. DIN-rail mounting.

3. Connectors shall be either copper or steel. Use of aluminum connectors shall not be permitted without prior approval of the Engineer

4. Phoenix Contact or approved equal.

2.06 SPARES AND EXPENDABLES

A. Provide the following spare parts:

1. One spare d.c. power supply of each type provided.
2. Five percent (rounded up) spare relays of each type provided.
3. Five percent (rounded up) spare surge suppressors of each type provided

B. Provide the following expendables:

1. Two year supply of corrosion inhibitor capsules
2. Ten percent (rounded up) spare fuses (minimum of 10) of each type and rating supplied.
3. Ten percent (rounded up) spare indicator light bulbs (minimum of 10) of each type and color supplied.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Control Panels shall be installed at the locations indicated on the Contract Drawings.

B. Control panels shall be provided to the mechanical subcontractor for installation.

C. Verify the correct installation of all panels supplied under this Specification Section.

END OF SECTION

SECTION 46.4
PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS)
FIBER OPTIC NETWORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Work includes furnishing, installing, and testing, fiber optic cable links as defined in the Contract Drawings.

B. The SYSTEM SUPPLIER defined in Specification Section 46.1 shall be responsible for coordinating all aspects of the fiber optic system.

C. All duct bank installation work covered by this specification shall be performed by a SubContractor experienced in fiber optic cable installation.

D. It is the ultimate responsibility of the CONTRCATOR to furnish a complete and fully operable system that supports the required functions specified elsewhere. The CONTRACTOR is to assume full responsibility for additional costs which may result from unauthorized deviations from the specifications.

E. Equipment found to be defective prior to system acceptance shall be replaced and installed at no additional cost to the OWNER.

1.2 REFERENCES

A. As specified in other Sections.

B. Bellcore Standards:
   1. GR-409, “Generic Requirements for Intrabuilding Fiber.”

C. Electronic Industry Association (EIA) 455B "Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components":
   1. FOTP-25 - Repeated Impact testing of Fiber Optic Cables and Cable Assemblies.
   2. FOTP-33 - Fiber Optic Cable Tensile Loading and Bending Test.
   3. FOTP-41 - Compressive Loading Resistance of Fiber Optic Cables.
   4. FOTP-81 - Compound Flow (Drip) Test for Filled Fiber Optic Cable.

5. FOTP-104 - Fiber Optic Cable Cyclic Flexing Test
6. FOTP-181 - Lightning Damage Susceptibility Test for Fiber Optic Cables with Metallic Components

D. Insulated Cable Engineer's Association (ICEA):
1. S-83-596, "Optic Fiber Premises Distribution Cables."
2. S-87-640, "Optic Fiber Outside Plant Communications Cable."
3. S-104-696, "Fiber Optic Premises Distribution Cables."

E. TIA/EIA Standards:
1. 598, "Color Coding of Fiber Optic Cables."

F. Underwriters Laboratories, Inc. (UL):
1. 1666 - Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.
2. 1685 - Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.

1.3 SUBMITTALS

A. Shop Drawings: Submit, in a single package, catalog information, descriptive literature and drawings for all components of the fiber optic system.

B. Installation Procedure: Submit the procedure proposed to be followed during duct bank cable pulls. The procedure shall include data sheets to be used to record cable pull lengths and the attenuation readings, before and after installation as defined in Part 3 herein. Conduits shall have 3 foot minimum radius.

C. Test Procedures: Submit the procedure to be followed during testing before and after installation, and after termination. Submit the supervising technician information. The supervising technician shall have BICSI qualifications.

1.3 FINAL DOCUMENTATION

A. Provide a complete wiring diagram of the entire fiber optic system including termination numbers at all fiber patch panels.

B. Distances and installed attenuation of all fiber runs within the duct bank system.

C. Provide a hard copy of all final documentation and also in electronic format on a Compact Disk.

PART 2 - PRODUCTS

2.1 REDUNDANT LOOP AND PLC DROP FIBER OPTIC CABLE

D. Provide fiber optic cable for implementing the fiber links required within the system.
   1. The fiber optic cable must meet the requirements of the National Electrical Code (NEC) Section 770.
   2. Riser Applications – Applicable Flame Test UL 1666.
   3. Finished cables shall conform to the applicable performance requirements of Table 8-6 and 8-7 in the Insulated Cable Engineers Association, Inc. (ICEA) Standard for Fiber Optic Premises Distribution Cable (ICEA S-83-596).
   4. Every fiber in the cable must be usable and meet required specifications.
   5. All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification.
   6. Each optical fiber shall consist of a doped silica core surrounded by a concentric glass cladding. The fiber shall be a matched clad design.
   7. All optical fibers shall be proof tested by the fiber manufacturer at a minimum load of 100 kpsi.
   8. All optical fibers shall be 100 percent attenuation tested. The attenuation shall be measured at 850 nm, and 1300 nm for multimode fibers. The attenuation shall be measured at 1310 nm and 1550 nm for single-mode fibers. The manufacturer shall store these values for a minimum of 5 years. These values shall be available upon request.
   9. The storage temperature range for the cable on the original shipping reel shall be –40°C to +70°C. The operating temperature range shall be –40°C to +70°C. Testing shall be in accordance with FOTP-3.
   10. The attenuation specification shall be a maximum attenuation for each fiber at 23 + 5°C.
   11. The attenuation of the cabled fiber shall be uniformly distributed throughout its length such that there are no discontinuities greater than 0.2 dB at 850 nm/1300 nm (multimode) in any one-kilometer length of fiber.
   12. Required Fiber Grade: Maximum Fiber Attenuation at 850 nm shall be 3.5dB/km.
   13. Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 3.0 mm.
   14. The cable shall contain 24 fibers. Each buffer tube shall contain up to 12 fibers.
   15. The fibers shall not adhere to the inside of the buffer tube.

16. Each fiber shall be distinguishable from others by means of color coding in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding."
17. The fibers shall be colored with ultraviolet (UV) curable inks.
18. Buffer tubes containing fibers shall also be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding."
19. In buffer tubes containing multiple fibers, the colors shall be stable during temperature cycling and not subject to fading or smearing onto each other. Colors shall not cause fibers to stick together.
20. The buffer tubes shall be resistant to kinking.
21. The cable jacket color shall be black.
22. Fibers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fibers shall be placed so that they do not interrupt the consecutive positions of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 3.0 nm in outer diameter.
23. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.
24. The outer cable jacket shall be marked with the manufacturer's name or UL file number, date of manufacture, fiber type, flame rating, UL symbol, and sequential length markings every two feet (e.g. "62.5/125 MICRON – TYPE OFNR – (UL) 00001 Feet"). The print color shall be white.
25. The cable shall be all-dielectric.
26. The cable shall be gel-free.
27. The outside diameter of the cable shall not exceed 7 mm.
28. Flammability – All cables shall comply with the requirements of the 1996 NEC Article 770. All cables shall pass UL 1666.
29. Fiber optic cable shall be as manufactured by Corning Cable Systems, Belden, BICCGeneral, AMP or equal.
30. The redundant loop shall contain 24 fibers and any remote links shall be a minimum of 6 fibers.

E. Duct Bank Cable. The fiber optic cable within the duct bank system shall also meet the following requirements:
   1. 50/125-micron 10GB @ 850nm multimode OM3 or OM4 fiber

2. Number of fibers as defined in the Contract Drawings, as a minimum network backbone cables shall have not less than 24 fibers per cable.
3. Indoor/outdoor rated for underground duct bank installation.
4. All dielectric loose tube.
5. Gel-filled.
6. PE outer jacket.
7. Manufacturer: Belden, Corning or approved equal.

F. Fiber optic cable within buildings shall also meet the following requirements:
1. Non-conductive, plenum rated
2. Type OFNP
3. PVDF outer jacket
4. Manufacturer: Belden, Corning or approved equal.

G. Fiber patch cables shall be manufacturer's pre-fabricated two fiber cables with length as required for the application.
1. The jumpers shall be 50/ 125 microns, multimode for operation at 850/1300 nm. They shall be tight-buffered and be protected by Kevlar-type strength material.
2. The jumpers shall be supplied with connectors on each end. All Jumpers shall be identified on each end with its source and destination. Connector type ST or LC shall be matched to the equipment provided. Jumpers shall be sized to provide a single connection between the fiber optic hardware being connected.

2.3 SPLICES

A. Splice installation shall be as follows:
H.

1. Submit all splice locations to the ENGINEER for approval before installation of the fiber cables.
2. Provide field splices in a splice tray located in a waterproof splice enclosure:
   a. Manufacturer: The following or equal:
      1) Tyco/Raychem FOSC style splice enclosure.
3. Loop the individual fibers a minimum of 1 full turn within the splice tray to avoid macro/micro bending.
4. After completion of cable terminations, neatly dress all cables.
5. Protect all splices with a thermal shrink sleeve.
6. Provide fusion type fiber optic cable splicing meeting the following requirements:
   a. Joins multimode or single mode fibers.

b. Establishes a permanent fusion splice.
c. Waterproof.
d. Re-enterable, re-arrangeable, and reusable.
e. Splice loss less than 0.10 dB.
f. Protected by a splice enclosure.

7. Requirement for outdoor fiber splice enclosures:
   a. Seal.
   b. Bond.
   c. Anchor.
   d. Protect fiber optic cable splices.
   e. Stand-alone unit that does not require an outer enclosure.
   f. Provide for a maximum of 6 cable entries in a butt-end configuration.
   g. Used in aerial, underground, and direct buried applications.
8. Requirement for indoor fiber splice enclosures:
   a. Anchor.
   b. Protect fiber optic cable splices.
   c. Stand-alone unit that does not require an outer enclosure.
   d. Suitable for the minimum number of splices at that location plus additional capacity for reconfigurations.
9. Re-splice any splice that has a loss greater than 0.10 dB.
10. Leave a minimum of 20 feet of fiber optic cable at each end of splice.

2.2 FIBER PATCH PANELS

I. Fiber patch panels (FPP) shall be provided at all locations where fiber optic cable enters a building. Fiber optic patch panel shall provide a single location for splicing, terminating, patching and testing fiber optic cables entering communication and control panels. Fiber patch panel shall have a protective housing for breakout of individual fibers and for splices. The splice area shall support fusion splices for 50 µm multimode optical fiber and shall provide strain relief for individual fibers. A slide-up or swing-open front door shall be provided.
   1. The patch panel shall be sufficiently sized to accommodate the full number of strands in each cable to be terminated plus 50% spare capacity.
   2. Each fiber strand in each multimode cable shall be terminated so that all strands of all cables are made available at bulkhead-mounted SC connectors that are mounted on patch panels.

3. The redundant ring patch panel shall have 96 LC/LC connectors to accommodate both (in and out) of the 24 fiber cables plus spares. All other patch panels shall have a minimum of 6 LC/LC bulkhead connectors.
4. Front and rear tilt-up lids shall provide unobstructed access to adapters and mounting plates.
5. The panel shall provide for patch cord and splice tray storage in the same unit.
6. The panel shall provide horizontal side cable entry ports.
7. The connector shall provide a strain relief mechanism for installation on a fiber cable that contains strength elements. The fiber within the body of the connector shall be isolated mechanically from cable tension, bending and twisting.
8. A directory shall be provided at the fiber optic patch panel logically identifying each optical fiber within.
9. Dust caps shall be furnished and installed on all unused patch panel connectors.

J. FPP located outside shall be NEMA 4X 316 Stainless Steel lockable enclosures.

K. FPP located indoors shall be NEMA 12 steel lockable enclosures.

L. FPP shall contain one or more housings with sufficient quantities of (LC-type) compatible adaptor panels to accommodate all fibers terminating within the FPP. This requirement includes all fibers.

M. The housing shall be equipped with strain relief for the cables and shall have a lockable access door.

N. Provide OFS Technology, Corning Cable Systems, or Siecor WCH housing with CCH connector panels, Superior, Hubbell, or approved equal.

O. Rack-Mounted systems shall have rack mounted cable management panels with patch panels, cable management, and vertical wireways.

2.3 FIBER OPTIC CABLE CONNECTORS.

A. All optical fibers shall be terminated with connectors that are type LC for multimode cable. Patch cables shall be used between the patch panels and network switch, using LC/ST connectors.

B. Fusion Splice. All fiber terminations shall utilize the fusion splice method by splicing the installed fiber to factory created pigtails or connectors. No mechanical connections shall be accepted. Connector style, LC shall be coordinated with the patch panels and field devices that will interface directly with the cable. Connectors shall be compatible with

the supplied cable. Connector loss shall be no greater than 0.3 dB. Loss measurement shall be performed at the time of splicing and documentation shall be furnished for each termination. Connectors shall be Corning Cable Systems Connectors, or approved equal.

C. Crimp Style Connectors. Not used.

2.4 ETHERNET UNSHIELDED TWISTED PAIR (UTP) CABLE

A. Ethernet cables and connectors shall be provided for a complete and working system, and/or as shown on the drawings. Cable for Ethernet wiring shall be UTP Cat-6 cable. Cable shall be Cat-6. Jacket color coding for cables shall be as follows:

1.	Standard Cat-6.	Yellow
2.	Crossover cables.	Red

B. Cable shall meet the following characteristics:

1. Category 6 UTP Cable. Cat-6 cable shall meet the following requirements:
   a. 24 AWG
   b. 4 pair solid strand FEP Teflon insulation
   c. 100 Ohm impedance
   d. 1-250 MHz frequency range
   e. Min attenuation 19.9 Db
   f. 100 Ohm impedance
   g. Min NEXT 44.3dB/100MHz
   h. Min PS-NEXT 42.3dB/100MHz
   i. Min ELFEXT 27.8dB/100MHz
   j. Min PS-ELFEXT 24.8dB/100MHz
   k. Min return loss 20.1 dB/100 MHz
   l. Max delay skew 45 ns
   m. Max propagation delay 540 ns
2. Plenum rated cable shall have FEP insulation jacketing and FEP insulation for conductors. Non plenum rated cable shall have PVC insulation jacketing and polyethylene insulation for conductors.
3. Cat-6 cable shall be Belden 1872 or equal.

C. Ethernet Patch Cables. Pre-wired and terminated patch cables with RJ-45 connectors and lever protecting boot shall be furnished for all connections to computers, network equipment, and controller equipment except where physical conditions (i.e. length over 12 ft. or conduit size) require unterminated wire to be installed. Patch cables shall be Cat-6 and shall meet the requirements of Cat-6 cable specified in this section. Straight through cables shall be wired using the T568-B standard for both connectors as shown in section

3.01, A, 1. Crossover cables shall be wired using the T568-A standard for one connector and the T568-B standard for the opposite end.

2.5 ETHERNET CABLE TEST EQUIPMENT

A. Provide one (1) hand-held Ethernet network cable tester that is compatible with the provided network cabling shall be provided. The cable tester shall check for open pairs, shorted pairs, crossed pairs, reversed pairs and split pairs for faults up to 100 m. Tester shall be Black Box "Model Localmap 100 TS620A", Fluke MicroScanner2 Pro, or equal.

B. Provide one (1) hand-held Fiber Optic Power Meter and Test Kit that is compatible with the provided fiber optic cabling shall be provided. The cable tester shall check for connector & fiber losses, bandwith, with software. Tester shall be Fluke SimpliFiber Pro, or equal.

C. This equipment shall become the property of the OWNER upon completion.

2.6 SPARE PARTS

A. Provide the following spares and expendables.
   1. Twenty (20) spare connectors (ST Type)
   2. Twenty (20) spare connectors (LC Type)
   3. Ten (10) spare patch cables ST-ST in 6-ft length with connectors installed.
   4. Splice Termination Kit.

PART 3 – EXECUTION

3.1 INSTALLATION

A. The System Supplier shall be responsible for the coordination of the installation of all cable furnished hereunder. The System Supplier shall be responsible for the termination of all cable furnished hereunder.
   1. Cable Damage: If the cable becomes damaged during installation, the CONTRACTOR shall stop work and notify the ENGINEER immediately. The Owner and ENGINEER will decide whether to replace the entire reel of cable or to install a splice at the damaged section. If the OWNER decides to replace the entire reel of cable, the CONTRACTOR shall begin the installation at the last designated splice point. The damaged cable between these points shall be removed, coiled, tagged, and given to the OWNER. Installation of new cable to replace damaged cable shall not be a basis of extra payment or contract completion time. In addition to installation of the new

cable, the CONTRACTOR shall reimburse the OWNER for the entire cost of the replacement reel of cable. This cost will be withheld from the contract price. If the OWNER decides to install a splice at the damaged point, and the cable is damaged a second time, the entire reel of damaged cable (and all subsequent damaged reels) shall be replaced with new reels at the CONTRACTOR's expense.

2. Ethernet Cable Installation: Straight through cables shall be wired using the T568-B standard for both connectors as shown in the table below (connector pin numbers are left to right with the clip down). Crossover cables shall be wired using the T568-A standard for one connector and the T568B standard for the opposite end as shown in the table below.

Connector Pin	568A Wiring Conductor	568B Wiring Conductor
1	White/Green	White/Orange
2	Green	Orange
3	White/Orange	White/Green
6	Orange	Green
4	Blue	Blue
5	White/Blue	White/Blue
7	White/Brown	White/Brown
8	Brown	Brown

3. Fiber Optic Cable Installation: The cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification. Fiber optic cable installation shall meet the following requirements:
   a. All fiber optic cable shall be installed, terminated, and tested by the System Supplier or his fiber subcontractor as specified above.
   b. In pulling the cable, strain-release, or other tension limiting devices shall be used to limit the pull tension to less than 600 lbs.
   c. Minimum bend radius restrictions shall be satisfied both during and after cable installation.
   d. Horizontal, unsupported cable runs shall be supported at continuous distances of 5 feet or less.
   e. All conduit and cabinet entrances shall be sealed with RTV or other re-enterable sealant material to prevent ingress of water, dust or other foreign materials.
   f. Cable routing within occupied office areas shall conform to Federal, State, and local electrical and fire codes.

g. Any non-terminating (field) splices shall be documented as to the physical location and cable meter mark (prior to stripping). Field splices shall be OTDR-tested and documented prior to final cable acceptance testing.

h. Fiber optic cables shall be installed in accordance with NECA 301- 2004, Installing and Testing Fiber Optic Cables.

B. Install suitably sized innerduct in all duct bank conduits. Exposed innerduct shall be labeled with fiber optic warning labels where they enter the duct bank and every three feet in between.

C. All conduit within buildings shall be labeled every six feet with fiber optic warning labels.

D. All cables within fiber patch panels shall be clearly labeled with destination.

E. Install all duct bank fiber cable runs in accordance with the manufacturers recommendations and including:

1. Use manufacturer approved cable lubricant.
2. Use a pulling winch that continuously monitors and records the pull tension.
3. Note from the distance markers on the cable the exact length of each installed run and record the information.

F. All pulling equipment and hardware that will contact the cable shall be sized to maintain the cable's minimum bend radius.

G. Do not utilize a figure-of-eight machine for installation without prior written confirmation of compatibility from both the machine and cable manufacturer.

3.2 TESTING

A. After the network cabling has been installed, each network cable shall be tested in the presence of the OWNER.

1. Test Equipment: Unless specified otherwise, all test equipment for the calibration and checking of system components shall be provided by System Supplier for the duration of the testing work and this test equipment will remain the property of System Supplier.

B. Ethernet UTP Cable Testing: The System Supplier shall utilize the previously specified test equipment, and additional tools as needed to validate the Ethernet UTP cable installation. All test equipment shall bear current calibration certification from a certified calibration laboratory, as appropriate. Each cable shall be tested for open pairs, shorted pairs,

crossed pairs, reversed pairs and split pairs. A check off sheet shall be utilized, shall be signed by the technician testing the cables, and shall be submitted for approval. Any identified faults shall be corrected at no additional cost.

C. Fiber Optic Cable Testing: Acceptance testing of the data highway (fiber and electronic equipment) shall be conducted as a part of integrated system field testing, as specified elsewhere. Prior to such tests, however, the fiber optic cable shall be tested as specified herein.

1. The System Supplier, or his fiber subcontractor, shall conduct fiber optic cable testing as specified below. All testing following field installation shall be witnessed by the OWNER. A test plan shall be submitted prior to the proposed test dates. The test plan and procedures shall be mutually agreed to prior to conducting the tests.
2. Each optical fiber of each fiber optic cable shall be OTDR (Optical Time Domain Reflectometer) tested on the reel at the factory, on the reel upon arrival at the jobsite, and after installation and termination. For each fiber, an OTDR (Optical Time Domain Reflectometer) trace soft/hardcopy is required to be provided to the Owner and ENGINEER. OTDR traces shall be provided for each test (at the factory, on the reel at the job-site, and after installation). A 100 foot launch cable shall be spliced to each fiber for each fiber OTDR test, to ensure accurate results. This end-to-end trace shall be performed from BOTH ends of the fiber. Also for each fiber, an end-to-end power attenuation (insertion loss) test shall be performed. The attenuation test shall use a stabilized optical source and an optical power meter calibrated to the appropriate operating wavelength (850 nm).
3. For each installed fiber, the power attenuation shall not exceed the following, tested from connector to connector at the respective patch panels:

$$(0.0035)L + (0.25)N + 3.0 \text{ dB}$$

Where L = the length of the fiber optic cable in meters and N = the number of splices in the fiber.

4. Any fiber optic cables containing one or more fibers not meeting this performance will not be accepted by the OWNER, and shall be repaired or replaced at no additional cost.
5. Each fiber optic jumper cable shall be tested and must exhibit an end-to-end attenuation of less than 2.0 dB at 1300 nm. Any jumper exceeding this level shall be replaced at no additional cost to the OWNER. Any damaged cable still on the reel shall be returned to the manufacturer for replacement at no additional cost to the OWNER.

6. All fiber cable testing shall be documented on pre-approved test forms. Three (3) copies of all documentation (including OTDR traces) shall be submitted to the ENGINEER upon successful completion of the testing.
7. Following installation, measure the attenuation of each run and compare the attenuation per foot readings with those taken prior to installation. Replace any runs whose attenuation per foot reading is more than 10% higher than the pre-installation value.

D. Provide all special testing materials and equipment.

E. Coordinate all testing with the CONTRACTOR, the ENGINEER, all affected suppliers, and the OWNER.

F. The ENGINEER reserves the right to test or retest any and all specified functions whether or not explicitly stated in the approved test procedures. The ENGINEER's decision shall be final regarding the acceptability and completeness of all testing.

3.3 TRAINING

A. Refer to Section for Training required.

1. Provide one (1) day of fiber optic testing training for up to 5 OWNER personnel on termination techniques and testing prior to installation.

END OF SECTION

SECTION 47 - ELECTRIC MOTORS

PART 1 - GENERAL

1.01 SUMMARY

A. Electric motors shall be of the high energy efficient and high-power factor type in full compliance with the "Federal Energy Policy Act of 1992." Motors shall be mounted on the equipment being driven. Motor characteristics shall be as specified under the Workmanship and Materials sections for equipment.

1.01 DESIGN

A. Motors shall conform to the latest ANSI Standards for rotating electrical machinery and in matters not covered therein, the latest NEMA Standards for motors and generators shall apply.

1.02 RATINGS

A. Motors shall have suitable output torque and speed characteristics to operate the driven equipment under design load conditions without exceeding their nameplate ratings. They shall have a 1.15 service factor. Definite purpose motors shall be used on specialized equipment requiring them.

B. Motors supplied for use with Variable Frequency Drives (VFD) and Reduced Voltage Solid State Starters (RVSS) shall be rated for inverter duty.

C. Ratings shall be based on NEMA Class B, 80 degrees C, temperature rise at rated conditions above an ambient of 40°C and shall have Class F moisture resistant insulation. This temperature rise shall be for continuous operation unless otherwise specified or approved.

1.03 OPERATING TYPES

A. Motors of 1/2 HP or larger shall be of the squirrel-cage induction type, designed for 3-phase, 60-Hertz, 460-volt operation, unless shown or specified otherwise. Smaller motors shall be of the capacitor induction type designed for single-phase, 115-volt, 60-Hertz operation unless otherwise noted or approved.

B. All motors, except where the driven equipment presents unusual requirements, shall have torque and locked rotor characteristics as outlined in the NEMA Standards for Design B.

C. All gear motors and speed reducers shall be designed for correct mounting position and rated in accordance with the application practice outlined in the Standards of the American Gear Manufacturers Association, for Class II service.

1.04 BEARINGS

A. All motor bearings shall be of the antifriction type except where otherwise shown or specified. All antifriction bearings shall have a minimum rating life of 100,000 hours, based on a reliability of 90 percent in accordance with ANSI B3.15. All motor bearings shall be oil or grease lubricated with convenient provisions for inspecting and servicing.

1.05 MECHANICAL PROTECTION

A. Motors shall be cast iron (including fan cover), rated severe duty, totally enclosed, and corrosion resistant, (mill and chemical duty type), unless a higher classification is required by the intended service. Vertical motors shall have solid shafts with high ring bases having ample space for coupling adjustments.

B. All motors shall be fan cooled except for smaller sizes (approximately 2 HP and less). All totally enclosed motors shall be tapped at a low point and fitted with an Appleton ECD 1/4-inch drain fitting.

1.06 INSTALLATION

A. Motors shall be of the right- or left-hand assembly, as required, so that the conduit box and nameplate will be readily accessible.

1.07 PERFORMANCE DATA

A. Motor make, type and rating, speed-torque curves, along with the outline dimensions and the guaranteed full load and locked rotor amperes at full voltage, shall be presented with the equipment details for review and approval.

B. Motors shall have the following minimum full load efficiency and uncorrected power factor ratings (efficiencies and power factor of motors at other speeds shall be as specified with driver equipment):

Motor Efficiency and Power Factor - Minimum Percent

	At 1800 RPM		At 1200 RPM	
Horsepower	Efficiency	Power Factor	Efficiency	Power Factor
1	82.5	74.3	80.0	69.7
1-1/2	84.0	76.5	85.5	62.0
2	84.0	70.3	86.5	70.1
3	87.5	79.9	87.5	73.7
5	87.5	83.8	87.5	75.8
7-1/2	89.5	82.4	89.5	78.2
10	89.5	85.0	89.5	76.4
15	91.0	85.0	90.2	81.1
20	91.0	84.6	90.2	81.9
25	92.4	84.5	91.7	82.0
30	92.4	84.2	91.7	82.5
40	93.0	84.2	93.0	83.3
50	93.0	85.0	93.0	84.9
60	93.6	86.8	93.6	85.7
75	94.1	86.6	93.6	86.0
100	94.5	88.3	94.1	86.4
125	94.5	89.3	94.1	85.8
150	95.0	88.5	95.0	87.5

The machine noise of the motors shall not exceed the following sound power levels when measured in accordance with IEEE Standard 85:

Overall Sound Power Level, Decibels, A-Weighted

Horsepower	At 1800 RPM	At 1200 RPM
1 - 2	70	67
3 - 5	74	71
7-1/2 - 10	77	74

15 - 20	81	78
25 - 30	85	80
40 - 50	89	84
60 - 75	90	88
100 - 150	90	93

1.08 TEST REPORTS

A. Unless the equipment specifications stipulate shop tests reports on the actual motors used the test data shall be on a representative motor of the same horsepower and speed. They shall show the motor full load and locked rotor amperes and full load efficiency and power factor rating, and be recorded on standard test forms as outlined in the NEMA Standards.

1.9 PAINTING

A. Painting shall meet the requirements of the Workmanship and Materials section headed “Painting.” All steel parts shall be chemically treated to ensure clean surfaces, then given a rust-resistant undercoat. Screws, nuts, bolts and similar items shall be of nonferrous metal or have an approved rust-resistant finish.

SECTION 48.1
HEAVY-DUTY DOUBLE THROW FUSIBLE SWITCH

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish and install a Heavy-Duty Double Throw Fusible Switch (DTFS) having the ratings, features / accessories and enclosures as specified herein and as shown on the Contract Drawings.

1.02 REFERENCES

A. The double throw switch and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:

1. UL 98
2. NEMA KS-1

1.02 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:

1. Dimensioned outline drawing
2. Conduit entry/exit locations
3. Switch ratings including:
    a. Short-circuit rating
    b. Voltage
    c. Continuous current
4. Fuse ratings and type
5. Cable terminal sizes
6. Product data sheets

1.03 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in section 2, and shall incorporate all changes made during the manufacturing process.

1.04 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.05 FIELD SERVICE

A. The manufacturer of the DTFS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.

PART 2 - PRODUCTS

2.01 RATINGS

A. Provide safety switch as shown on drawings with the following ratings:

1. 30 to 800 amperes

2. 600 Volts AC

3. 3-pole

4. Upper utility switch shall be: fusible

5. Lower emergency switch shall be: fusible

6. Mechanical lugs suitable for aluminum or copper conductors.

2.02 CONSTRUCTION

A. Switch blades and jaws shall be visible and plated copper,

B. The switch shall have a red handle that is easily pad-lockable with three 3/8-inch shank locks in the OFF position,

C. Switches shall be of double throw design such that both switches may not be closed simultaneously. Handle operation shall have an "off" position between the two on positions,

D. Switches shall have deionizing arc chutes,

E. Switches shall have factory-installed ground lug kit,

F. Switch assembly and operating handle shall be an integral part of the enclosure base,

G. Switch blades shall be readily visible in the "ON" and "OFF" position,

H. Switch operating mechanism shall be non-teasable, positive quick-make/quick-break type; bail type mechanisms are not acceptable,

I. Fusible switches shall be labeled as suitable for service entrance equipment,

J. Switches shall have a solid or switched neutral as shown on the drawings,

K. Switches shall have line terminal shields,

L. Switches shall be suitable for systems capable of 100 kA at 600 V,

M. Embossed or engraved ON-OFF indication shall be provided,

N. Double-make, double-break switch blade feature shall be provided,

O. Renewal parts data shall be shown on the inside of the door.

2.03 ENCLOSURE

A. Enclosure shall be NEMA 4X.

B. Paint color shall be ANSI 61 gray.

C. 600 and 800 amp enclosures shall include a “Z” mounting channel on the back for assistance in mounting.

D. 600 and 800 amp switches shall be equipped with lifting eyes.

2.04 ACCESSORIES

A. The following accessories shall be provided:

1. Factory installed neutral kit

2. Factory installed ground lug kit

3. Factory installed Class R fuse clips

4. Lock ON provisions

2.05 SPARE PARTS

A. The Contractor shall furnish two complete sets of each fuse type as spare parts.

2.06 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

1. Insulation check to ensure the integrity of insulation and continuity of the entire system

2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards.

3. Mechanical tests to verify that the switch’s power sections are free of mechanical hindrances.

4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic.

B. The manufacturer shall provide three (3) certified copies of factory test reports.

2.07 MANUFACTURER

A. The DTFS Eaton model as shown on the Drawings Parts Schedule, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The contractor shall install all equipment per the manufacturer's recommendations and the contract drawings.

B. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations.

SECTION 48.2
AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.01 GENERAL

A. Section Includes: Requirements for providing automatic transfer switches.

B. Related Work Specified in Other Sections Includes, But is Not Limited to, the following:

1. W-45 – Electrical
2. W-46 – Controls
3. W-76 – Conduit, Wiring, and Grounding

1.02 REFERENCE

A. Codes and standards referred to in this Section are:

1. NFPA 70 - National Electrical Code (NEC)
2. NEMA ICS 10 - AC Automatic Transfer Switches
3. UL 486A - Wire Connectors and Soldering Lugs For Use With Copper Conductors
4. UL 1008 - Standard for Automatic Transfer Switches

1.03 SYSTEM DESCRIPTION

A. Design Requirements: Provide equipment capable of operating in an ambient temperature range of 0 to 40 degrees C and humidity of up to 90 percent noncondensing.

1. Arrange the equipment for convenient and ready accessibility from the front, for inspection and maintenance of all devices, terminals and wiring.

1.04 SUBMITTALS

A. General: Furnish all submittals, including the following, as specified in Specific/General Provisions and Section W-51.01.

B. Product Data and Information: Furnish manufacturer's data for all

associated equipment and devices indicating dimensions, size, voltage ratings, current ratings, withstand and interrupting ratings.

C. Shop Drawings: Furnish shop drawings for automatic transfer switches to include the following:

1. Outline drawings showing arrangement, elevations and identification of components.
2. Bill of materials including manufacturers' name and catalog number.
3. Interconnecting wiring diagrams.
4. Individual schematic and wiring diagrams.

D. Quality Control: Furnish the following test reports and certificates as specified in the Specific Provisions:

1. Certified Shop Test Reports for the automatic transfer switch and related components.

E. Operation and Maintenance Manuals: Furnish operation and maintenance manuals as specified in the Specific/General Provisions.

1.05 QUALITY ASSURANCE

A. Codes: Manufacture all automatic transfer switches in accordance with NEMA ICS10, and UL 1008.

1. Manufacture and install each automatic transfer switch in accordance with the NFPA 70 and local codes.

B. UL Label: Provide a UL Label on each automatic transfer switch.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Deliver, store, and handle all products and materials as specified in Specific/General Provisions.

B. Shipping and Packing: Provide all structures, equipment and materials rigidly braced and protected against weather, damage, and undue strain during shipment.

C. Storage and Protection: Store all equipment and materials in a dry, covered, heated and ventilated location. Provide any additional measures in accordance with manufacturer's instructions.

1.07 SPARE PARTS

A. General: Furnish the following spare parts:

1. Two complete replacements of all indicating lamps and fuses used in the installation.

2. Two of each special tool required for maintenance.

B. Packaging: Pack spare parts in containers bearing labels clearly designating contents and related pieces of equipment. Deliver spare parts in original factory packages. Identify all spare parts with information needed for reordering.

1.08 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.

1. Automatic Transfer Switch

a. ASCO Controls 7000

b. General Electric Zenith ZTS

c. Kohler Power Systems

PART 2 - PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCH REQUIREMENTS

A. Description: Provide enclosed, double-throw automatic transfer switch with single operating mechanism.

B. Configuration: Electrically-operated, mechanically held with required relays, controls, and contacts.

C. The automatic transfer switch shall be standard transition type with an in-phase monitor to ensure that the pump motor back EMF will not trip any protective device when switching the motor load from the Generator source back to the Utility source. Scenarios where switching of the motor load activates any protective device (and thus deactivates the pump motor) will be addressed and corrected by the manufacturer at no cost to the owner.

D. All elements of the drive system must be replaceable from the front of the switch, and the power switching devices must be replaceable without removal of the connecting cables.

E. The transfer switch shall be listed under U.L. 1008, in a NEMA 1 enclosure.

2.02 RATINGS

A. Voltage: 480V

B. Switched Poles: 3

C. Amperage: 150A

D. Loads: Combination tungsten, ballast, resistance, and inductive loads.

E. Withstand and Closing Ratings: 35,000 minimum rms symmetrical amperes at 480V, when used with molded-case circuit breaker.

F. Thermal capacity: 20 times continuous ampere rating at 60 cycles.

2.3 COMPONENTS

A. Phase Sequence: A-B-C, left to right, front to back, top to bottom.

B. Contacts: Provide silver surfaced main contacts protected by a separate renewable arcing contact. Mechanically lock normal and emergency contacts by the operating linkage when in the open or closed position. Provide an operating linkage that will not permit a neutral position when a failure of any coil or disarrangement of any part occurs.

C. Operating Mechanism: Isolate the mechanical driving system and mechanical interlocks to be electrically dead. Do not use molded plastic parts for the operating linkage between the electrical operator and the main operating shaft of the switch.

D. Main Bearings: Radial, ball-bearing type.

E. Sensing and Control Relays: Continuous-duty, industrial type with wiping contacts rated 10 amperes minimum.

F. Control Logic: Solid-state, microprocessor-based with generator exercise accessories.

G. Arc Barriers: Provide arc barriers and arc suppression for each pole.

2.4 ACCESSORIES

A. Indicating Lights: Provide 30.5 mm, LED type indicating lights mounted in the cover of the enclosure to indicate the following:

1. Utility available

2. Generator available

3. Load connection to Utility.

4. Load connection to Generator.

B. Test Switch: Mount in the cover of the enclosure to simulate failure of Utility or Generator.

C. Full phase protection. Solid-state phase monitor shall be field adjustable, close differential type, with 85-100% pick-up and 75-98% drop-out. A single adjustment shall set all phases.

D. Solid-state voltage and frequency monitor on generator output to prevent transfer prior to proper output parameters, adjustable 85-100% of generator rated voltage and frequency, with adjustable drop-out of 75-85% of pick-up setting.

E. Adjustable, solid-state, 0.5 to 6 seconds time delay on engine starting to override momentary outages and nuisance voltage dips.

F. Adjustable, solid-state, 2 to 30 minutes time delay on retransfer of load to normal.

G. Adjustable, solid-state, 2 to 30 minutes cool-down timer wherein the generator set runs unloaded after retransfer to line.

H. Motor load decay time delay, adjustable for 1.5 to 15 seconds and operating on transfer to either source.

I. Adjustable, solid-state, 0.5 seconds to 5 minutes time delay on transfer to emergency source after verification of emergency source voltage and frequency.

J. Test switch to simulate normal power failure, heavy duty, oil tight, pushbutton type with momentary contacts and override circuitry to revert to normal power if emergency source should fail during test.

K. Three (3) pilot lights, to indicate the normal and emergency position of the transfer switch, and mode selector switch in "off" position.

L. Engine starting contacts to provide for generator starting.

M. Plant exerciser to start and run the generator set with or without load (in-field switchable) each 168 hours for a 30-minute interval.

N. Four (4) position mode selector switch marked "test", "auto", "off", and "engine start".

O. Equipment grounding lug.

P. Cable connection lugs, cu/al type for all conductors.

Q. A fully-rated solid neutral.

R. Nameplates: Nameplates shall be rigid laminated phenolic with black surface and white core. Each nameplate shall be fastened to the compartment door with two
(2) screws. The unit nameplates shall be 1” x 3” minimum with 1/8” high characters. Abbreviations are not acceptable.

S. Finish: Smooth and clean the enclosures and prime coat the inside and outside surfaces. Standard indoor finish is gray ANSI No. 49.

T. Phase Monitor Fuse Holders and Fuses

1. The Fuse Holders shall be three-pole, 600V rated units suitable for use with Class CC, rejection type fuses. They shall be UL listed for branch circuit protection, and have a fuse withstand rating of 200 kA. The handle shall isolate the fuse from the circuit when installing or removing fuses— no special tools shall be required to insert or remove fuses. The fuse holder shall be provided with a blown fuse indicator to allow for easy troubleshooting. The fuse holder shall mount on a standard DIN rail.

2. The Fuse Holder shall be model 1492-FB3C30-L as manufactured by Allen Bradley, or equal. The fuses shall be Bussmann Limitron fast acting model KTK-R or equal, with the ampacity as shown on the Drawings.

U. Power Phase Monitor

1. A Phase Monitor shall be provided and installed in the automatic transfer switch as shown on the Drawings and specified herein. The unit provided shall have the following features:

   a. Input— 480 volt, 3-phase, 60Hz, 4-wire, utility service
   b. Adjustable voltage range control
   c. SPDT relay operation and LED indication shall be triggered by phase loss, low voltage, power failure, or improper phase sequence.
   d. LED indication shall be on when voltage is normal— off with fault
   e. Relay shall operate if fault lasts more than 2.0 seconds.
   f. Relay shall release after voltage is normal for 5.0 seconds
   g. Relay contact rating— 10 Amps
   h. Mounting— 8-pin plug-in— provide socket for DIN rail

2. Phase Monitor shall be model SUA-440-ASA as manufactured by ATC Diversified Electronics, or equal.

V. Auxiliary Relays

1. Provide Two (2) auxiliary relays each with S.P.D.T. contacts that close when connected to normal source and two (2) S.P.D.T. auxiliary contacts that close when connected to emergency source. Relays shall be utilized to interlock pumps while under generator power.

2.5 ENCLOSURE

A. Enclosure: NEMA 1

B. Accessibility: Provide an enclosure with all current carrying contacts and parts readily accessible from the front for maintenance and inspection without removal of the switch panel, disconnecting of the operating linkage, or disconnecting of power conductors.

PART 3 - EXECUTION

3.1 AUTOMATIC SEQUENCE OF OPERATION

A. Controller: Provide a programmable, microprocessor-based controller to provide an automatic sequence of operation as follows:

1. The automatic transfer switch controller shall start the generator and initiate a transfer to the generator when Utility power falls below the following thresholds:

a. Utility voltage drops below 85 percent from rated nominal value or frequency varies more than 10 percent from rated nominal value.

2. Once Utility power has been restored to normal values, the transfer switch shall retransfer the load from the generator back to the Utility source (after an adjustable time delay).

3.2 INSTALLATION

A. General: Install all equipment in accordance with the manufacturer's recommendations and approved shop drawings and as specified in the Specific Provisions.

B. Cable Connections: Terminate and label all field wiring per the approved diagrams.

C. Torque Requirements: Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturers' published torque tightening recommendations. Where manufacturers' torquing requirements are not available, tighten connectors and terminals in accordance with UL Standard 486A.

3.3 FIELD QUALITY CONTROL

A. Inspections: Inspect, adjust and check the installation for physical alignment, cable terminations and ventilation.

B. Adjustments: Make all necessary adjustments to the equipment to provide complete and satisfactory operation upon completion of the Contract.

C. Tests: Perform field tests as follows:

1. Inspect and test the installation with respect to the safety requirements of NFPA 70 pertaining to grounding and insulation resistance.

2. Demonstrate proper operation of the automatic transfer switch by simulating conditions.

3. Repair or replace defective materials at no cost to the OWNER.

3.4 OPERATION DEMONSTRATION

A. Manufacturer's Representative: Provide the services of the automatic transfer switch manufacturer's representative to assist in installation, start-up, field testing, calibration, placing into operation and providing training, as specified in the Specific/General Provisions. The representative is required to carry out a thorough inspection of the installation and certify that the installation is correct and complete in accordance with the manufacturer's instruction and to confirm that the automatic transfer switch is ready for the final acceptance. Also to instruct operating personnel in the operation and maintenance of the automatic transfer switch.

B. Training: Following completion of installation and field testing provide training for 6 employees of the OWNER in the proper operation, troubleshooting and maintenance of the equipment as outlined below. All training will be at the OWNER'S facilities at a time agreeable to the OWNER:

1. Operational Training: A minimum of one 2-hour sessions combining both classroom and hands-on instruction, excluding travel time.

2. Maintenance Training: A minimum of one 2-hour sessions combining both classroom and hands-on instruction, excluding travel time.

END OF SECTION

SECTION 49
REDUCED VOLTAGE SOLID STATE STARTER

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the requirements for the Reduced Voltage Solid-state Starter (RVSS) equipment.

B. The RVSS shall be designed for use with a standard three-phase, three-wire, squirrel cage, induction motor.

C. The unit shall be microprocessor based and programmed to slowly increase the voltage to the motor over an adjustable acceleration time, providing a shock free, smooth acceleration, while drawing the minimum current necessary to start the motor.

D. The RVSS shall be equipped with an internal by-pass contactor that will close at the end of acceleration time, thus reducing heating and saving power.

1.02 ACCEPTABLE MANUFACTURERS

A. The Reduced Voltage Solid-state starter shall be a Solcon Industries Ltd. Model Number RVS-DX-58-480-115-8-U-S with Conformal Coated control boards.

PART 2 - PRODUCTS

2.01 GENERAL PROVISIONS

A. The RVSS shall be designed to meet the following specifications:

1. GENERAL

a. Supply Voltage (Vn): V +10%-15%
b. Frequency: 45 – 65 Hz
c. Control Supply: 115 V +10% -15%
d. Load: HP Per Drawings, 3-phase, three-wire, induction motors.

e. Standard display along with a remote keypad

2. START-STOP PARAMETERS

a. Motor FLA: Per Drawings
b. Start/Stop Profile: Field Programmable
c. Kick Start: A pulse of 80% Vn, adjustable range 0.1-1 Sec.
d. Initial Voltage: 10-50% VN
e. Initial Current: 100-400% of Motor FLA
f. Current Limit: 100-400% of Motor FLA
g. Acceleration Time: 1-30 Sec
h. Deceleration Time: 1-30 Sec

3. MOTOR PROTECTION

a. Too Many Starts: Maximum number of starts, range: OFF or 1-10, during a time period of 1-60 min.

b. Starts inhibit: Period of 1-60 min, during which starting is prevented, after too Many Starts Fault.

c. Long Start Time: Maximum allowable starting time 1-30 sec.

d. Over Current (Instant): Two operation functions: during starting trips the starter at 850% and during running at 100-850% In, both within one Cycle (after internal delay).

e. Overload Class: Overload Class shall be selectable between NEMA Class 10, NEMA Class 20, or NEMA Class 30. The cool down time after an overload shall be non-adjustable, fixed time setpoint.

f. Under Current: Trips when current drops below 20-90% In, time delay 1-40 sec.

g. Under Voltage: Trips when main voltage drops below 50-90%, time delay 1-10 Sec. w/ optional automatic reset.

h. Over Voltage: Trips when main voltage increase above 110-125%, time delay 1-10 sec.

i. Phase Loss, U/O Freq: Trips when one or two phases are missing and frequency is below 45Hz. or above 65Hz w/ optional automatic reset.

j. Phase Sequence: Trips when phase sequence is wrong

k. Shorted SCR: Prevents starting / trips if motor is not connected or incorrectly connected to the starter, or in case one or more SCRs have been shorted

l. Heat Sink Over temp: Trips when heat-sink temperature rises above 85°C.

m. External fault: Trips when an External Contact closes for 2 sec.

4. CONTROL

a. Displays: LCD (2-lines of 16 characters) and 4 LEDs.

b. Keypad: 6 keys for easy setting

c. Fault Contact: 2 Contacts, 8A, 250VAC, 2000VA

d. Aux. Contact: 2 Contacts, 8A, 250VAC, 2000VA

5. TEMPERATURE/HUMIDITY

a. Operating Temp.: -10° to 40°C
b. Storage Temp.: -20° to 70°C
c. Humidity: 95% at 50°C or 98% at 45°C.

6. STANDARDS

a. Dielectric Test: 2500VAC

b. EMC Emissions: EN 55011 CISPR 11 Class A

c. EMC Immunity: EN 55082-2 ESD 8KV air, IEC 801-2 Electric RF field 10 V/m, 20-1000MHz, IEC 801-3 Fast transients 2KV, IEC 801-4

d. Safety EN 600947-1 Related to safety requirements. Designed and assembled to conform with UL508C

SECTION 50 - SECURITY SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Work includes engineering, furnishing, programming, installing, testing, documenting and placing in operation a security system for the City of Tampa facility(ies) associated with this project.

B. As Supplier of the security systems for other Authority owned facilities, the Work defined herein shall be performed by or under the supervision of (henceforth referred to as Supplier).

C. The supplier of the security system (Supplier) shall furnish all labor, materials, equipment, programming, services and incidentals required to install and place into operation a Personal Computer-based security system configured as shown on the Contract Drawings, and as specified herein. Camera system is to run independent of the SCADA system and utilize a separate cellular communication network for delivering camera data to the City's Technology & Innovation Department's (T&I) camera system. The cellular modem shall be as specified in Section W-46.1. Up to four (4) cameras may be networked into a single working cellular firewall/antenna node. If more than four (4) cameras are required, provide an additional cellular modem, not exceeding four (4) cameras per modem..

D. All Work defined herein shall be performed by or under the supervision of the Supplier and coordinated with the City's Technology and Innovation Department.

E. The Supplier shall meet the following minimum requirements:

1. Be a certified Florida electrical contractor.

2. Be an authorized Axis Gold Partner and authorized reseller of Axis products.

3. Meet EIA/TIA standards

F. The Supplier shall be

1. Alta Vista Communications, Inc.

2. City Approved Equal.

G. The system, as installed, shall fully comply with all Federal, State, and City ordinances regarding video surveillance signage.

H. Equipment found to be defective prior to system acceptance shall be replaced and installed at no additional cost to the Owner.

I. All engineering development required by the Supplier shall be in accordance with the Conditions of this Contract.

J. The Supplier shall furnish all labor, materials, equipment, services and incidentals required to place into operation all equipment shown on the Contract Drawings and as specified herein.

K. Auxiliary and accessory devices necessary for system operation or performance, such as transducers or relays to interface with equipment provided by other Suppliers under other Sections of these Specifications, shall be included whether they are shown on the Contract Drawings or not.

L. All equipment and installations shall satisfy applicable Federal, State and local codes including EIA/TIA standards.

1.02 RELATED WORK

A. Division 26 and W – Electrical Requirements

1.03 SYSTEM DESCRIPTION

A. The system shall comprise the following major elements:

1. Provide new pole mounted cameras. Refer to Drawings for camera locations and quantities.

2. Provide new wall mounted cameras. Refer to Drawings for camera locations and quantities.

3. One (1) Gigabit Ethernet unmanaged PoE+ network switch sized to accommodate quantity of Cameras and one Cellular modem.

4. One (1) new Network Interface Panel (otherwise known as Cat6 Patch Panel) located in the existing building with Cat6 connection to Ethernet unmanaged PoE+ network switch.

5. One Pepwave cellular modem.

6. Provide one wooden fireproof back panel minimum 2' x 2' or sized to accommodate the network switch, patch panel, and the Pepwave cellular modem.

B. All cameras shall be IP based operating over PoE. The cameras shall be equipped with SD cards for video recording.

C. Each camera shall be connected to the Gigabit Ethernet unmanaged PoE+ network switch using Cat6 ethernet. Provide Cat6 surge protection on the cables.

D. The camera locations and system network are shown in the Contract Drawings.

1.04 SUBMITTALS

A. Submit shop drawings electronically in searchable, PDF format to the Engineer and Owner for approval. Paper binders will not be accepted.

B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities as specified herein.

C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the Engineer as not approved.

D. Submit the following Shop Drawings in a single package:

1. Catalog information, descriptive literature, wiring diagrams, and shop drawings on all components, including all miscellaneous electrical and mechanical devices furnished under this section.

2. Complete part numbers for all components, including any options, shall be identified. Provide manufacturer's data that correlates to the complete part number including all options.

3. System network block diagram.

4. Installation details for all field mounted devices to show conformance with the Contract Documents.

1.05 SHIPPING AND HANDLING

A. Shipping Precautions. Special instructions for proper field handling, storage and installation required by the manufacturer for proper protection, shall be securely attached to the packaging for each piece of equipment prior to shipment. The instructions shall be stored in re-sealable plastic bags or other acceptable means of protection.

B. Identification. Each component shall be tagged to identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.

C. Storage. Equipment shall not be stored outdoors. Equipment shall be stored in dry permanent shelters including inline equipment and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor at his/her own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the Contractor, or the apparatus shall be replaced by the Contractor at his/her own expense.

1.06 FINAL DOCUMENTATION

A. Prior to final acceptance, operating and maintenance manuals covering instruction and maintenance on each type of equipment shall be furnished in accordance with the specification.

B. Submit shop drawings electronically in PDF format. Paper binders will not be accepted.

1. A comprehensive index.

2. A complete "As Constructed" set of approved shop Drawings.

3. A complete list of the equipment supplied, including serial numbers, ranges and pertinent data.

4. Full specifications on each item.

5. System schematic drawings "As Constructed", illustrating all components and electrical connections of the components supplied under this Section.

6. Detailed service, maintenance and operation instructions for each item supplied.

7. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.

8. Complete parts lists with stock numbers and name, address and telephone number of the local Supplier.

9. A USB containing the shop drawing data in PDF format in the binder sleeve.

C. The Contractor's final documentation shall be new documentation written specifically for this project but may include standard and modified standard documentation. Modifications to existing manuals shall be made on the respective pages or inserted adjacent to the modified pages. All standard documentation furnished shall have all portions that apply clearly indicated. All portions that do not apply shall be lined out.

D. The manuals shall contain all illustrations, detailed drawings, wiring diagrams and instructions necessary for installing, operating and maintaining the equipment. The illustrated parts shall be numbered for identification. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable. All such illustrations shall be incorporated within the printing of the page to form a durable and permanent reference book.

1.07 QUALITY CONTROL

A. The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.

B. Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the Supplier stating that the equipment famished has been manufactured in accordance with the National Electric Code and OSHA requirements.

C. International Society of Automation (ISA) and National Electrical Manufacturers Association (NEMA) standards shall be used where applicable in the design of the system.

D. The Supplier shall have an established service facility from which qualified technical service personnel and parts may be dispatched upon call. Such a service facility shall be no more than four (4) hours travel time from the jobsite.

E. The Supplier shall provide experienced personnel on-site to coordinate and/or perform installation, termination, and adjustment; on-site testing; Owner training; and startup assistance for the system

F. Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the Owner.

1.08 WARRANTY AND GUARANTEE

A. In accordance with Division 1, the Supplier shall furnish to the Owner a written two year guarantee commencing with final acceptance, that all equipment and parts thereof, material and/or workmanship for the field elements, instruments, and control panels are of top quality and free from defects.

B. The Supplier shall guarantee all equipment whether or not of his own manufacture.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Equipment to be installed in a hazardous area shall meet Class, Group, and Division classification as shown on the Contract Electrical Drawings, or comply with the local or National Electrical Code, whichever is the most stringent requirement.

B. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single Manufacturer, insofar as possible, and shall consist of equipment models which are currently in production.

C. The equipment shall be designed to operate satisfactorily between 0 degrees C and 40 degrees C at up to 95 percent Relative Humidity (non-condensing).

D. All equipment shall be designed to operate on a 60-Hertz alternating current power source at a normal 120 volts, plus or minus 10 percent, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

E. All equipment furnished shall be designed and constructed so that in the event of power interruption, or temperatures outside the operational range, the systems specified hereunder shall go through an orderly shutdown with no loss of memory, and resume normal operation without manual resetting when power is restored.

F. All switches shall have double-pole, double-throw contacts rated at a minimum of 600 volts-amperes (VA), unless specifically noted otherwise.

G. Electronic equipment shall utilize printed circuitry suitably coated to prevent contamination by dust, moisture and fungus. Solid-state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

2.02 CAMERAS

A. All cameras shall be IP addressable, powered by Power-over-Ethernet+ (PoE+) IEEE 802.3 and provided in outdoor ready enclosures.

B. Cameras shall have the following additional features:

1. Image Sensor: Progressive scan CMOS sensor technology.

2. Lens: Varifocal, IR Corrected, CS-Mount 2.8-8.5mm, F1.2 with digital PTZ.

3. H.264 JPEG video compression.

4. Ability to automatically switch frames per second on motion detection.

5. Equipped with minimum 128 GB SD card for video recording.

6. Power over Ethernet multi-view cameras as indicated in the plans, compatible with the City's existing system. Axis Communications, or City Approved Equal.

7. Cameras will be configured by the City's Technology & Innovation Department. Each location requires a unique configuration.

C. Cameras will be routed to a Gigabit Ethernet unmanaged PoE+ network switch and shall meet the following requirements:

1. Provided as shown in the Contract Drawings.

2. Gigabit Ethernet unmanaged PoE+ network switch sized to accommodate quantity of Cameras and one Cellular modem.

3. Incoming AC Power Surge Suppressor. EDCO HSP121BT or approved equal.

4. Incoming power breaker.

5. Two Duplex convenience outlet.

D. Cameras shall be provided with pole mounting hardware by Supplier.

2.03 SECURITY SYSTEM SWITCH

A. System Switch. Gigabit Ethernet unmanaged PoE+ network switch sized to accommodate quantity of Cameras and one Cellular modem. The ethernet switch will be wall mounted on the backboard as described in 1.03 A 6.

2.04 VIDEO MANAGEMENT SYSTEM

A. The system shall integrate with the City's existing Genetec Omnicast VMS. Provide all required camera licenses including Genetec GSC-Om-E-1C Enterprise Camera connections and ADV-CAM-E-1Y Advantage licenses for each camera added to the network.

B. Provide network equipment including unmanaged PoE+ switches, fiber uplinks, patch panels, all to be wall mounted on the backboard as described in 1.03 A 6 for termination of all security system network equipment.

2.05 CELLULAR MODEM FOR VIDEO TRANSPORT

A. Pepwave Cellular Modem – MAX-BR1-MINI-5GN-T-M-PRM or City Approved Equal.

B. External Cellular Antenna – DW-IN2713 – Panorama 4 in 1 Omni-directional antenna 10m/33 cables 4x5G MIMO White kit or City Approved Equal.

1. External Cellular Antenna to be mounted on the exterior of the facility in a manner that allows best cellular signal strength.

C. Cellular Modem will be routed to the Gigabit Ethernet unmanaged PoE+ network switch.

D. SIM cards will be ordered in coordination of the City's T&I department.

E. Cellular Modem will be configured by the City's T&I Department. Each location will require a unique configuration.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install the equipment in the location indicated on the Drawings and follow manufacturers' installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturers' instruction, and these Contract Documents, follow Engineer's decision, at no additional cost. Keep a copy of manufacturers' instructions on the jobsite available for review at all times.

B. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance. Coordinate work with the Owner and work of other trades to avoid conflicts, errors, delays, and unnecessary interference with operation of the existing plant during construction.

C. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and type of surface of the original finish. Clean and polish the exterior of all panels and enclosures upon the completion of the demonstration tests.

D. Coordinate grounding requirements with Division 26, Electrical.

3.02 START-UP

A. Coordinate all IP addresses with the City.

B. T&I Dept will coordinate for installation of Genetec Security Center software on appropriate PCs/Laptops identified by the Department. T&I Department will authorize employees as identified by the Department to allow access to the Genetec Security System.

C. Provide a minimum of three eight-hour days of on-site system setup to initialize the system to the Owners direction including:

1. Focus settings on fixed cameras.

2. Frame recording frequency during normal and motion events.

3. Video retention times.

4. Weekday and weekend recording schedules.

5. Provisioning, network configuration, and testing of the cellular modem connection to ensure reliable video transmission back to the City's central Video Management System.

3.03 TRAINING

A. The cost of training programs to be conducted with Owner's personnel shall be included in the Contract price.

B. All training schedules shall be coordinated with, and at the convenience of the Owner. Shift training may be required to correspond to the Owner's working schedule.

C. Provide a minimum of eight hours of operator training on the use of the system.

SECTION 72 - VIDEO INSPECTION

W-72.01 General

Video inspections of storm sewers and underdrains shall be performed immediately upon completion of the initial backfill operations and prior commencing with surface restoration by means of a radial view closed-circuit color television camera. The inspection will be done one manhole section at a time. Flow and standing water in new sewer sections requiring inspection shall be maintained and controlled as required to allow passage of the camera and to allow a visual inspection of the entire circumference of the pipe along the length of the pipeline. Contractor will be required to submit methods for controlling flow and standing water during these inspections. Prior to the inspection of newly constructed sewers, water shall be run through the pipeline so that depressions or dips in the alignment can be identified during the inspection.

Upon completion of the inspection and documentation, the contractor shall submit all documentation to the City for review for compliance with the specifications. Upon notice of acceptance of the video inspection work, the contractor shall immediately commence with surface restoration work.

W-72.02 Camera

The video camera used for the inspection shall be specifically designed and constructed for inspections of pipelines. The camera shall be capable of providing a radial view for inspection of the top, bottom, and sides of pipe and for looking up lateral connections. The camera shall be mounted on adjustable skids, or self propelled, to keep it in the center of the pipe. Lighting of the camera shall be supplied by a lamp on the camera, capable of being dimmed or brightened remotely from the control panel. The lighting system shall be capable of lighting the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions and shall have a minimum of 650 lines of resolution. The camera, monitor, recording devices, and other components of the video system shall be capable of producing a picture quality satisfactory to the Engineer.

The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, cables, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the pipe conditions shall be used to move the camera through the

sewer line. If, during the inspection operation, the camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire sewer section, the Contractor shall immediately report this information to the City. The City shall be notified of the problem and the Contractor shall repair the deficiency to the City's satisfaction.

When manually-operated winches are used to pull the camera through the line, telephones or other suitable means of communication shall be set up between the two manholes of the section being inspected to ensure good communications between members of the crew.

W-72.03 Measurements

The importance of accurate distance measurements is emphasized. A distance meter shall be used for accurately recording the location of defects and key features along the pipeline. The distance meter shall be a direct reading, above ground, friction clamp device or other suitable equipment. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. The meter shall be capable of reducing readings for reverse movement of the camera and shall be capable of being manually re-zeroed for each new setup. The importance of accurate distance measurements is vital. Accuracy of the measurement meter shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device. Footage measurements shall begin at the centerline of the starting manhole and end at the centerline of the ending manhole. Footage shall be shown on the video view and recorded at all times.

W-72.04 Documentation of Inspection

Written video inspection reports shall be provided for each line segment inspected to document defects and key features along the pipeline. The National Association of Sewer Service Companies (NASSCO) coding system shall be used. Information that should be included in the inspection logs is indicated below. One (1) copy of these records shall be supplied to the City.

Video recordings shall also be supplied to provide a visual and audio record of the interior inspection. Video playback shall be at the same speed that it was recorded. A complete recording shall be made of each line televised. A voice recording shall be included that provides brief and informative comments on the sewer conditions. **All video inspections shall be in DVD format.** The video file shall be a viewing format and compatible with viewing in Microsoft Windows Media Player.

Inspection reports shall use NASSCO standard coding system and shall include, but not be

limited to, the following information:

- Date, time, city, street, name of operator, inspector, and weather conditions.
- Pipe diameter, pipe material, section length, depth of pipe, length between joints, and corresponding video recording identification.
- Location of each point of leakage.
- Location of each service connection.
- Location of any damaged sections, nature of damage, and location with respect to pipe axis.
- Deflection in alignment of grade of pipe.

Video recordings shall include written information on the screen and an audio recording describing the inspection and findings. The DVD shall be labeled with information on the location of the inspection, description of the sewer lines, date, inspection company, and other information to identify the inspections included on the DVD. The following information shall be included in video:

Visual (on screen in corner):

- Report number.
- Date of television inspection.
- Sewer section and number.
- Pipe size and material
- Distance along reach (tape counter footage).

Audio:

- Date and time of television inspection, operator name, name of overlying or adjacent street, and manhole numbers.
- Verbal confirmation of sewer section and television direction in relation to direction of flow.
- Verbal description of pipe size, type, and pipe joint length.
- Verbal description and location of each service connection and pipe defect.

W-72.05 Acceptance

Upon review by the City to confirm the system complies with the specifications, the Contactor shall immediately commence surface restoration work.

SECTION 76
CONDUIT, WIRE, AND GROUNDING

PART 1 - GENERAL

1.01 SUMMARY

A. Conduit, wire, and grounding includes furnishing and installing all conduits, underground ducts, bus ducts, wires, cables, and grounding systems as shown, specified, and required for a complete installation. The work includes the furnishing and installation of wires and cables in flexible and rigid conduits, underground ducts, all as required, shown, and specified.

B. Descriptive literature and technical information relative to conduits, wires, and grounding shall be submitted by the Contractor in conformance with the requirements of the General Provisions.

C. The Contractor shall, with reference to approved drawings of equipment being installed, prepare detailed plans showing the layout and size of all conduits, ducts, bus ducts, cables and wires, connections between the point of service connection and all utilizing equipment. These plans shall be in sufficient detail to serve as working drawings for the installing electricians. The drawings shall be to scale not less than the Plans and be prepared as the work develops with approval by the Engineer before major steps of work are undertaken.

D. During construction, careful notes shall be kept of all deviations or changes in the layout or connection diagrams. Upon completion of the work, all working drawings shall be corrected and then marked “Record Drawings”. One set of final prints, along with a bound instruction manual and parts lists shall be given to the Engineer at the end of the job.

E. Excavation, backfill, form work, concrete, and reinforcing shall be in accordance with the applicable Workmanship and Materials sections.

1.02 UNDERGROUND DUCTS

A. In general, underground ducts for feeders and control wiring shall be plastic

conduit. The plastic conduit shall be PVC, Schedule 80, and U.L. Inc. listed for direct burial, as manufactured by Carlon, Triangle, Allied Tube, or equal. The conduit shall be buried a minimum of 18 inches below grade. Manufactured fitted plastic duct spacers shall be used for installation spacing.

B. Ducts installed under streets, roads, alleys, driveways, and parking lots; and conduits leading from the wet well to junction boxes; shall be rigid aluminum conduit covered with no less than 40 mils of PVC, as manufactured by Plasti-Bond, Perma-Cote, KorKap, or equal. The PVC material shall conform to the applicable ASTM standards and UL 6A. The conduit shall be buried a minimum of 24 inches below grade unless otherwise noted or allowed by the NEC.

C. Each duct shall be carefully cleaned before and after installation. All inside surfaces shall be free from imperfections likely to injure the cable. After installation of complete duct runs in sizes 2 inches and larger, ducts shall be snaked with an approved tube cleaner equipped with an approved cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the duct. Ducts through which the mandrel will not pass shall not be incorporated in the work. After snaking, the ends of dead-ended ducts shall be protected with standard conduit caps to prevent the entrance of water or other foreign matter.

D. Where ducts enter buildings or at stub-ups to equipment, transitions to aluminum conduits shall be made as noted and detailed. Where it is not otherwise shown, all ducts entering buildings and structures shall have transitions to aluminum conduit at least 5 feet from the outermost edge of the pile cap or footing supporting the outermost vertical wall of the building or structure.

E. Transitions from above-grade rigid aluminum conduit to nonmetallic conduit shall be accomplished with a threaded adapter. Rigid aluminum conduit installed above grade and extending below grade shall include the first 90° elbow. All rigid aluminum conduits extending below grade shall be coated with two coats of an asphaltum-type paint along its entire length below grade and extending 6” above grade or above the top of the finished slab. The asphaltum-type paint shall conform to Fed. Spec. TT-V-51 and equivalent to Koppers Bitumastic Super Service Black.

1.03 LIQUIDTIGHT FLEXIBLE CONDUIT

A. Liquidtight Flexible Nonmetallic Conduit (LFNC)

1. All flexible conduits size 2-inch or less in non-classified areas shall be nonmetallic, liquidtight, and have a circular cross section. The conduit shall be resistant to oil, water, heat, sunlight, corrosion, most acids, ozone, alkali, strains, abrasions, and crushing. The conduit shall be rated for continuous use at 140°F and be U.L. Inc. listed.

2. Compatible liquidtight nonmetallic fittings with aluminum locknuts shall be used for conduit installation.

3. The flexible conduit and fittings shall be as manufactured by Carlon, Kellems, K-Flex, or equal.

B. Liquidtight Flexible Metallic Conduit (LFMC)

1. All flexible conduits greater than 2-inch in non-classified areas shall be metallic, liquidtight, and have a circular cross section. The conduit shall be of a light-weight aluminum core, coupled with a PVC jacket. The conduit shall be resistant to sunlight, acid, and oil. The conduit shall be rated for a working temperature between -20°C to 80°C and U.L. Inc. listed.

2. Compatible liquidtight metallic fittings shall be used for conduit installation.

3. The flexible conduit and fittings shall be as manufactured by Thomas & Betts or equal.

1.04 METALLIC CONDUIT AND BOXES

A. All conduit shall comply with the requirements of the U.L. Inc. Standards. Conduit shall be delivered to the job site in standard bundles having each length suitably marked with the manufacturer's name or trademark and bearing the label of the U.L. Inc. inspection service. The minimum size conduit service shall be 3/4 inch.

B. All exposed conduit within buildings and exposed on outdoor structures shall be rigid heavy wall, 6063 alloy, T-1 temper, aluminum conduit. Aluminum conduit shall conform to Fed. Spec. WW-C-540 and ANSI C80.5.

C. All conduit encased in building structures, exposed in the screen room/wet well area, or otherwise noted, shall be rigid aluminum covered with not less than 40 mils of PVC outside, and 2 mils of urethane inside, as manufactured by Plasti-Bond, Perma-Cote, KorKap, or equal. The physical properties of the PVC and urethane materials shall conform to the applicable ASTM standards and UL 6A.

D. Cast copper-free aluminum shall be used for outlet boxes and fittings in aluminum conduit systems. Outlet and junction boxes shall be of proper dimensions for each application. Cast metal boxes shall have watertight gaskets and covers secured with stainless steel screws. Outlet boxes shall be Crouse-Hinds type FS, FD, or equal.

E. PVC coated boxes and fittings shall be used in PVC coated conduit systems.

F. Conduit fittings, such as elbows, tees, couplings, caps, bushings, nipples, and locknuts shall be constructed of the same material as the conduit and be threaded to provide watertight connections. Conduit bodies shall be copper-free cast aluminum with gasketed aluminum covers secured with stainless steel screws and be type Form 7 or Mark 9 as manufactured by Crouse-Hinds, or equal.

G. Where it is necessary to use electrical unions, Universal, Erikson, or equal conduit couplings shall be used.

1.05 CONDUIT INSTALLATION

A. All conduits shall be installed as required. The conduit system shall be installed complete with all accessories, fittings, and boxes, in an approved and workmanlike manner to provide proper raceways for electrical conductors.

B. The Contractor shall note that conduit runs shown are for the purpose of outlining the general method of routing the conduits to avoid interferences.

C. All other conduits shall be run exposed, except where shown otherwise.

D. Sizes not shown shall be one size larger than indicated in Tables 1 and 4, Chapter 9, of the NEC. Exposed conduit shall be run parallel to or at right angles from walls or beams and plumb on columns and on walls. Conduit shall not be run through beams except where approved by the Engineer or specifically detailed. Where possible, conduit shall be pitched slightly to drain to the outlet boxes or otherwise installed to avoid trapping of condensate. Where necessary to ensure drainage, Appleton Type ECD, Crouse-Hinds, or equal, 1/4-inch drain fitting shall be installed in the trapped conduit at low points.

E. Factory made bends or elbows shall be used wherever possible. Field bends shall be carefully made to prevent conduit damage or reduction in the internal area. The bending radius shall be not less than six times the nominal diameters of the conduit with carefully matched bends on parallel runs to present a neat appearance. The number of crossovers shall be kept to a minimum.

F. All conduit shall be reamed to remove burrs before installation. Aluminum conduit shall be cut with a saw to prevent reduction in internal area. To seal out air and moisture, lower electrical resistances, and prevent seizing and galling; aluminum conduit threads shall be given a coat of Aluma-Shield surface compound, as manufactured by Thomas & Betts, prior to assembly. All connections and joints in all conduit runs shall be watertight and ensure a low resistance ground path in the conduit system. All conduit runs shall be swabbed to remove foreign matter before wires are pulled in. Conduit terminations in boxes, panels, switchboards, motor control centers, and other sheet metal enclosures shall be bonded together for grounding and be fitted with insulating bushings, O.Z./Gedney Type A, Thomas and Betts, or equal. Where grounding bushings are required by code or shown, O.Z./Gedney Type SBLG, Thomas and Betts, or equal shall be furnished.

G. Conduit shall be neatly grouped where several lines follow a parallel course, and shall be well supported, using stainless steel clips or hangers of the ring or trapeze type. Clips, hangers, and support rods shall be held by self-drilling anchors, power-driven fasteners, or stainless-steel channel insets in the concrete ceilings or walls. Perforated strap hangers will not be accepted.

H. Conduit runs that enter the building from outdoors, or that pass through refrigerated or air-conditioned areas, are subject to moisture accumulation due to condensation. A pull box shall be provided in the conduit run near the point of temperature change to prevent trapping of moisture within the conduit system. A 1/4-inch weep hole shall be drilled in the bottom of the pull box. After the wires and cables are installed, the end of the conduit continuing into the warmer area shall be packed with a nonsetting sealing compound.

I. All PVC coated aluminum conduit shall be installed using specialized tools and equipment as recommended by manufacturer. The Contractor shall ensure those installing PVC coated aluminum conduit are certified by the manufacturer prior to beginning installation. Installation of PVC coated aluminum conduit shall not begin until a copy of an unexpired Certified Installer Card for each installer is submitted and approved by Engineer.

J. All conduit shall be securely fastened in place and supported at maximum 5 feet intervals.

1.06 CONDUIT CONNECTIONS TO EQUIPMENT

A. The conduit system shall terminate at the terminal box or at the conduit connection point of electric motors, devices, and equipment. Terminations of conduits at such locations shall permit direct wire connections to the motors, devices, or equipment.

B. Conduit connections shall be made with rigid conduit if the equipment is fixed and not subject to adjustment, mechanical movement, or vibration. Myers water-tight /dust-tight hubs shall be used for outdoor, below grade, or wash down areas. Rigid conduit connections shall have union fittings to permit removal of equipment without cutting or breaking the conduit.

C. If equipment is subject to adjustment, mechanical movement, or vibration, conduit connections shall be made with approved flexible conduit and conduit connections shall be watertight. Flexible conduit shall not be installed in lengths longer than 3 feet. Flexible conduit shall transition to rigid aluminum conduit using

an approved conduit fitting.

1.07 EXPANSION FITTINGS

A. Expansion fittings shall be installed at all expansion joints and where required by codes. Conduit expansion fittings shall be Crouse-Hinds Type XD, O.Z./Gedney Type DX, or equal.

1.08 TERMINAL, JUNCTION, AND PULL BOXES

A. Junction and pull boxes shall be installed as shown and as required.

B. Surface-mounted junction and pull boxes, unless specified otherwise herein, shall be of cast aluminum complete with mounting lugs, threaded entry bosses and flange or rabbeted gasketed covers.

C. Surface-mounted junction and pull boxes which would exceed 50 pounds weight if cast or which are shown as fabricated sheet metal boxes shall be made of 1/8-inch sheet aluminum, or equivalent stainless steel, with sides return channel flanged around the cover opening or with approved welded angle or channel supporting frames. Sheet aluminum boxes shall be provided with mounting lugs or channels and with conduit termination hubs. All seams in sheet aluminum boxes shall be continuously welded and ground smooth. All surface boxes larger than 6 inches square shall be mounted a minimum of 3/4 inch clear of the mounting surface by means of offset lugs or support channels.

D. Fabricated junction and pull boxes which are partially or fully encased in concrete shall be made of 10-gauge sheet stainless steel and fabricated in a similar manner to the sheet aluminum pull boxes specified herein, complete with mounting lugs or channels and conduit termination hubs. Cast aluminum boxes shall be provided in smaller sizes where required for full or partial encasement in concrete.

E. All junction and pull boxes shall be provided with covers or doors as shown or required. Covers and doors shall be fabricated of materials equal in weight, gauge, structure, and metallic composition as the basic box. All covers shall be gasketed and held in place with stainless steel captive knurled head screw slot bolts. All pull

and junction boxes shall be provided with hinged doors. Doors shall have continuous hinges, and 3-point catches with external handles and hasps for padlocks. All doors shall be gasketed.

F. All boxes shall be provided with partitions as shown and as required.

G. Fabricated boxes shall be rated NEMA 12 for indoor, above grade areas; rated NEMA 4X for outdoor areas; and manufactured by Hoffman, Hope, or equal.

1.09 HAZARDOUS AREAS

A. All conduit and equipment installed in or routed through hazardous areas, as well as other electrical appurtenances installed therein, shall be installed to conform in every respect to Chapter 5 of the NEC for Class I, Division 1, Group D hazardous locations, unless noted otherwise. All material installed in hazardous areas shall be listed as complying with the requirements of the U.L. Inc. for use in Class I, Group D atmospheres. Terminal Boxes and Enclosures mounted in Hazardous Areas shall be NEMA 7, cast aluminum.

B. Sealing shall be provided for all conduits within and leaving hazardous areas as required.

1.10 GROUNDING SYSTEM

A. A complete grounding system shall be in accordance with applicable ANSI, IEEE, and NEC Standards and local codes.

B. All noncurrent-carrying metal parts of the electrical wiring system shall be grounded. The grounding system shall include, but not be limited to, the following:

1. Motor control center controllers, ground bus, and enclosures.

2. All motor frames.

3. All conduit systems.

4. All mechanical equipment and structures.

5. Distribution and lighting panelboards.

6. Control, relay, and instrumentation panels.

7. Lighting fixtures and receptacles.

8. Fans, blowers, pumps, and similar equipment.

9. Hoist beams, cranes, and similar items.

C. A grounding connection from the transformer to the City water pipe shall be provided. The wire and conduit shall be attached to the City water pipe with a U.L. Inc. listed cast bronze U-bolt connector with silicon bronze bolts and nuts.

D. Motor frames shall be grounded by means of stranded, 600-volt insulated copper cables installed within the motor feeder conduit system. The cable shall be lug bolted to the motor terminal box and the ground bus of the motor control center serving the motor.

E. An equipment grounding conductor shall be installed in all electrical raceways and shall be sized in accordance with Article 250.122 of the National Electrical Code (NEC).

F. Exposed or buried ground conductors shall be bare copper wires or bars of the proper sizes.

G. All exposed ground cables or bars shall be firmly and neatly supported in place at proper intervals. Where subjected to mechanical abuse, protective enclosures shall be provided.

H. Grounding conductors run in conduits with circuit conductors shall be stranded cable with 600-volt green XHHW, TW, THW, or RHW Code insulation.

I. Stainless steel ground rods shall be 5/8-inch diameter with the length as required and made up of a 10-foot section with 5-foot sections added as required. Rods shall be driven to permanently moist soil.

J. Connections to ground rods, transformer case ground bus bars, case grounds, bare ground grid conductors, and the like, shall be made by an exothermic welding

process or by clamps specifically designed for this application.

K. Ground conductor connections to ground bus bars in motor control centers, and the like, shall be cable lug bolted terminations equal to line conductor terminations specified hereinafter.

L. Welds embedded in the ground or concrete shall be cleaned and painted with an asphaltum base paint.

M. Tests shall be conducted by the Contractor and witnessed by the Engineer to determine the ground impedance for the entire system. The test shall be accomplished by using a ground loop impedance tester. The result shall not exceed 2 ohms at any point of test. If necessary, additional ground rods shall be installed at locations approved by the Engineer.

N. Care shall be exercised to ensure good electrical connections between the conduits and metallic enclosures of switchgear, control centers, and the like. Grounding jumpers shall be installed where necessary to accomplish this purpose.

1.11 WIRES AND CABLES- GENERAL

A. Wires and cables required for all systems shall be complete, connecting all equipment and control components. Conductors shall be of ample size, with suitable insulation as specified hereinafter.

1.12 600-VOLT WIRE AND CABLE-CONDUCTORS

A. All ground conductors and power, control, and lighting conductors shall be soft-drawn or annealed stranded copper wire meeting the requirements of ASTM B 3 or B 33. For lighting fixture and convenience outlet wiring only, conductors No. 10 AWG and smaller may be solid conductor. Conductors shall be sized to limit the maximum conductor temperature to less than 75°C, except where specifically stated otherwise. Table 310.16 of the NEC shall be the guide in determining 600-volt conductor sizes. The minimum size of conductor for power and lighting wiring shall be No. 12 AWG.

1.13 600-VOLT POWER AND CONTROL CABLE-INSULATION

A. Low voltage circuits shall be wired with 600-volt insulated conductors, sized as shown, or as required by the actual load to be served, whichever is larger.

1. **Single Conductor:** Insulation for single 600-volt copper conductors shall be cross-linked polyethylene compound, U.L. Inc. listed, NEC Type XHHW-2, with surface print cable identification; as manufactured by Okonite, American, Southwire or equal.

2. **Multiconductor Cables:** Individual conductors shall be insulated with 15 mils of polyethylene or PVC and 4-mil nylon jacket. The bundle of conductors shall be wrapped with tape binder and an outer jacket of not less than 45 mils of PVC. Use ICEA Method 1 for color coding wires.

1.14 INSTRUMENTATION/DATA CABLES-INSULATION

A. Instrumentation and control circuits shall be wired with low voltage conductors, sized as shown.

1. **4-20 mA Analog:** Shielded two-conductor No. 16 AWG cables for instrumentation shall be properly stranded 600-volt insulated copper wire twisted cables as shown. Conductor insulation shall be polyethylene. Shields shall be overlapped metalized tape providing 100% coverage with tinned copper drain wire. Cable outer jacketing shall be of polyvinyl chloride. Cables shall be Belden #8719, or equal.

2. **Three Conductor:** Stranded No. 16 wire, 600-volt polyethylene insulation, twisted conductors, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of PVC. Belden Cat. No. 8618.

3. **Category 5:** Provide cable having third party verification to TIA/EIA 568-A Category 5 requirements and constructed of four pair of stranded No. 24 AWG solid copper wire, polyethylene or polypropylene insulation, stranded No. 24 AWG tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of

gray PVC. Belden Cat. No. 1624R.

4. **Twinaxial (Data Highway):** Provide stranded No. 20 AWG tinned copper wire (9.5 ohms/mile), 78 ohm nominal impedance, 300 volt polyethylene insulation, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and 55 percent tinned copper braid shield (4.1 ohms/mile) and outer jacket of blue PVC. Belden Cat. No. 9463.

5. **1-1/2 Pair (RS-485):** Provide three stranded No. 22 AWG tinned copper wires with 300-volt FHDPE insulation, a tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage, 90 percent tinned copper braid shield and a PVC outer jacket. Insulated wires shall be configured as one twisted pair and one reference conductor— 120 Ohms characteristic impedance. Belden Cat. No. 3106A.

1.15 600-VOLT WIRE AND CABLE-INSTALLATION

A. The 600-volt wires and cables pulled into ducts and conduit shall be installed without the use of lubricants, except where such use is necessary and approved by the cable manufacturers and the Engineer. Wires and cables shall be carefully handled to avoid twists and kinks in the conductors or damage to the insulation. All trapped conduit and duct lines shall be swabbed to remove any accumulated moisture or debris before wires or cables are pulled in.

B. Cable reels shall be stored on concrete or other hard surface or shall be lagged with 2 x 4 wood laggings providing 100% coverage.

C. No splicing will be permitted, except in junction boxes.

D. Lug bolting at devices, bus bars or motors shall be made up with a flat washer, a Belleville washer, and a locknut. The length of the bolt shall not extend more than a couple of threads past the end of the locknut. Lugs shall have holes that match the size of the bolt. The minimum size for feeder lugs shall match the bolt size of lugs on motor wiring. If motor lugs don’t match, lugs shall be changed to match size of bolt, using a proper crimping tool.

E. Lines of nylon or polypropylene, propelled by carbon dioxide or compressed air, shall be used to snake or pull wire and cable into conduits. Flat steel tapes or steel cables shall not be used.

1.16 600-VOLT WIRE AND CABLE- SPLICES AND TERMINATIONS

A. Splices between copper conductors, size no. 10 AWG and smaller, shall be made up with compression type butt connections. Splices between copper conductors, size no. 8 AWG and larger, shall be made up with U.L. Inc. listed compression type tube connectors.

B. Lug bolting at devices, bus bars or motors shall be made up with a flat washer, a Belleville washer, and a locknut. The length of the bolt shall not extend more than a couple of threads past the end of the locknut. Lugs shall have holes that match the size of the bolt. The minimum size for feeder lugs shall match the bolt size of lugs on motor wiring. If motor lugs don't match, lugs shall be changed to match size of bolt, using a proper crimping tool.

C. Splices and pigtail connections for lighting and receptacle wiring inside the buildings, no. 10 AWG and smaller, shall be made with a pre-insulated, spring connectors, or equal.

D. Stranded copper wire size no. 8 AWG and smaller for terminal block connections, shall be made with a ferrule to wire termination. The ferrule shall be insulated and extend from the stripped insulation, then compressed with a properly sized crimping tool. The ferrule shall be manufactured by Phoenix Contact, or equal.

E. Splices and lug terminations in 600-volt insulated cables shall be carefully taped and covered, using materials recommended by the cable manufacturer, to provide watertight insulation equal to that of the conductors.

F. Lug terminations at motor connections shall be insulated using three layers of tape. The first layer shall have a wrap of varnished cambric tape (Scotch 2520 or equal). As an alternative to varnished cambric tape, self-fusing silicon rubber tape (Scotch 70 or equal) or vinyl electrical tape (Scotch 33, 88 or equal) may be used. If vinyl electrical tape is used, the wrap shall be installed upside down. The second layer shall have a wrap of rubber splicing tape (Scotch 23, 130C, or equal). The

third layer shall have a wrap of vinyl electrical tape (Scotch 33, 88, or equal).

G. Splices shall not be made within manholes unless specifically approved by the Engineer.

1.17 600-VOLT WIRE AND CABLE-TESTS

A. The 600-volt insulated cables shall be factory tested prior to shipment in accordance with IPCEA standards for the insulation specified.

B. The following 600-volt wires and cable shall be tested after installation but before final connections are made up:

1. All feeders from motor control centers to motors 30 horsepower and larger.

2. All feeders from variable speed drive units.

3. All feeders from motor control centers to lighting panels and dry-type transformers.

C. For the above listed cables, a test voltage of 1,500 volts AC shall be applied for a period of 1 minute between all conductors in the same conduit, and between each conductor and ground.

D. All tests shall be made at the Contractor's expense, and certification of the tests shall be submitted to the Engineer. If any failures occur during the tests, the Contractor shall replace the cable.

1.18 IDENTIFICATION OF CIRCUITS

A. All wires and cables shall be banded with an identifying number and color code at each end termination and at each splice point in junction boxes. The identifying number of each wire shall be determined at the point of circuit origin and shall continue unchanged to the point of circuit termination. In each conduit system, the wire identifying numbers shall include the conduit designation with a numeral suffix. The numeral suffix shall start with No. 1 and continue as required.

B. Where conduits enter motor control centers, switchgear terminal cabinets, and the like, the identification tag shall be fastened to the wire bundle near the conduit termination. The tag shall be held by an adjustable, self-locking nylon "Ty-Rap" as manufactured by Thomas and Betts Co., or equal. The identifying tag shall be of aluminum, brass, rigid fiber, and shall be engraved, stamped, or painted with the scheduled conduit number.

C. The wire identifying numbers and color code shall be applied as PVC slip-on sleeves, properly fitted to the wire diameter. The sleeves shall be as manufactured by Brady Co., Thomas and Betts Co., or equal.

Color Coding:

PHASE	**208/120 VOLTS**	**240/120 VOLTS**	**480Y/277 VOLTS**
A	Black	Black	Brown
B	Red	Orange (High-Leg)	Orange
C	Blue	Blue	Yellow
Neutral	White	White	Gray or White
Ground	Green	Green	Green

1.19 WIRE AND CABLE CONNECTIONS TO EQUIPMENT

A. Electrical connections shall be made to all equipment in strict accordance with the manufacturer's approved wiring diagrams, the Plans, or as approved by the Engineer. The Contractor shall be responsible for the accuracy of his work and shall repair any damage and replace any damaged equipment resulting from erroneous connections.

1.20 PAINTING

A. Conduit and boxes shall be painted in accordance with the Workmanship and Materials section headed “Painting.”

B. Where aluminum surfaces such as boxes, conduit, or structural supports come in contact with incompatible metals, lime, mortar, concrete, or other masonry materials, the contact areas shall be given one field coat of Koppers Metal Passivator No. 40 and one coat of Koppers Bitumastic Super Service Black or two coats of asphalt varnish conforming to Fed. Spec. TT-V-51.

SECTION 108 - DEWATERING

108.1 General.

108.1.1 Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified, Florida-licensed professional engineer, using performance requirements and design criteria indicated.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

108.1.2 Submittals:

108.1.2.1 Shop Drawings (for dewatering system): Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.

1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

108.1.2.2 Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

108.1.2.3 Qualification Data: For qualified installer and professional engineer.

108.1.2.4 Field Quality-Control Reports

108.1.2.5 Videotape: Show existing conditions (prior to, during, and after construction) of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

108.1.3 Quality Assurance:

108.1.3.1 Installer Qualifications: An experienced installer that has specialized in dewatering work.

108.1.3.2 Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

108.1.3.3 Preinstallation Conference: Conduct conference at the project site. Review methods and procedures related to dewatering including, but not limited to, the following:

1. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
2. Geotechnical report.
3. Proposed site clearing and excavations.
4. Existing utilities and subsurface conditions.
5. Coordination for interruption, shutoff, capping, and continuation of utility services.
6. Construction schedule. Verify availability of installer's personnel, equipment, and facilities needed to make progress and avoid delays.
7. Testing and monitoring of dewatering system.

108.1.4 Project Conditions:

108.1.4.1 Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by the City or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify the City and the utility owner no fewer than two (2) days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without City's and utility owner's written permission.

108.1.4.2 Project Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by the geotechnical engineer. The City will not be responsible for interpretations or conclusions drawn from this data. Make additional test borings and conduct other exploratory operations necessary for dewatering.

108.1.4.3 Survey Work: Engage a qualified, Florida-licensed land surveyor to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify City if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

108.2 Execution.

108.2.1 Preparation:

108.2.1.1 Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

108.2.1.2 Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the City and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

108.2.1.3 Provide temporary grading to facilitate dewatering and control of surface water.

108.2.1.4 Monitor dewatering system continuously.

108.2.1.5 Promptly repair damages to adjacent facilities caused by dewatering.

108.2.1.6 Protect and maintain temporary erosion and sedimentation controls during dewatering operations.

108.2.2 Installation:

108.2.2.1 Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal and surface water controls. Space well points or wells at intervals required to provide sufficient dewatering. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

108.2.2.2 Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

108.2.2.3 Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom off foundations, drains, sewers, and other excavations. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

108.2.2.4 Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations. Maintain piezometric water level a minimum of 24 inches below surface of excavation.

108.2.2.5 Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction of completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

108.2.2.6 Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to the City. Remove dewatering system from project site on completion of dewatering. Plug or

fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

108.2.2.7 Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

108.2.3 Field Quality Control

108.2.3.1 Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated in the dewatering plan; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevations of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

108.2.3.2 Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION 108

SECTION 110 - CLEARING AND GRUBBING

110-1 Description.

Clear and grub within the areas shown in the plans to be cleared and grubbed. Remove and dispose of all trees, stumps, roots and other such protruding objects, structures, appurtenances, existing flexible asphalt pavement, and other facilities necessary to prepare the area for the proposed construction. Remove and dispose of all product and debris not required to be salvaged or not required to complete the construction.

110-2 Standard Clearing and Grubbing.

110-2.1 Work Included: Completely remove and dispose of all buildings, timber, brush, stumps, roots, rubbish, debris, and all other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas, and all other structures and obstructions necessary to be removed and for which other items of the Contract do not specify the removal thereof, including septic tanks, building foundations, and pipes.

Perform Standard Clearing and Grubbing within the following areas:

(a) All areas where excavation is to be done.

(b) All areas where structures will be constructed, including pipe culverts and other pipe lines.

110-2.2 Depths of Removal of Roots, Stumps, and Other Debris: In all areas where excavation is to be performed, remove roots and other debris to a depth of 12 inches below the ground surface. Remove roots and other debris from all excavated material to be used in the construction. Plow the surface to a depth of at least 6 inches, and remove all roots thereby exposed to a depth of at least 12 inches. Completely remove and dispose of all stumps.

Remove all roots, etc., protruding through or appearing on the surface of the completed excavation within the roadway area and for structures, to a depth of at least 12 inches below the finished excavation surface.

Within all other areas where Standard Clearing and Grubbing is to be performed remove roots and other debris projecting through or appearing on the surface of the original ground to a depth of 12 inches below the surface, but do not plow or harrow these areas.

110-3 Selective Clearing and Grubbing.

The Contractor shall remove and dispose of all vegetation, obstructions, etc., as provided above except that, where so elected, the Contractor may cut roots, etc., flush with the ground surface. Completely remove and dispose of stumps. Entirely remove undergrowth except in specific areas designated by the Engineer to remain for aesthetic purposes. Trim, protect, and leave standing desirable trees. Perform Selective Clearing and Grubbing only in areas so designated in the plans.

110-4 Protection of Property Remaining in Place.

Protect and do not displace property obstructions which are to remain in place, such as buildings, sewers, drains, water or gas pipes, conduits, poles, walls, posts, bridges, etc.

110-5 Removal of Existing Structures.

110-5.1 Structures to be Removed: Remove and dispose of the materials from existing structures. Remove the following: (1) those structures, or portions of structures, shown in the plans to be removed; (2) those structures, or portions of structures, found within the limits of the area to be cleared and grubbed, and directed by the Engineer to be removed; (3) those structures, or portion of structures, which are necessary to be removed in order to construct new structures; and (4) other appurtenances or obstructions which may be designated in the Contract Documents as to be included in an item of payment for the work under this Article.

Notify the Florida Department of Environmental Protection (DEP) using DEP Form 62-257.900(1) “Notice of Asbestos Renovation or Demolition” at least 10 working days prior to the demolition or renovation of any structures, even if asbestos is not found on the project. Provide a copy of this notice to the Engineer.

110-5.2 Method of Removal:

110-5.2.1 General: Remove the structures in such a way so as to leave no obstructions to any proposed new structures or to any waterways. Pull, cut off, or break off pilings to the requirements of the permit or other Contract Documents, whichever requires the deepest removal, but not less than 2 feet below the finish ground line. In the event that the plans indicate channel excavation to be done by others, consider the finish ground line as the limits of such excavation. For materials which are to remain the property of the Department or are to be salvaged for use in temporary structures, avoid damage to such materials, and entirely remove all bolts, nails, etc. from timbers to be so salvaged. Mark structural steel members for identification as directed.

110-5.2.2 Removal of Steel Members With Hazardous Coatings: Provide to the Engineer for approval, a copy of the "Contractor's Lead in Construction Compliance Program" from the firm actually removing and disposing of these steel members before any members are disturbed.

Vacuum power tool clean any coated steel member to bare metal as defined by SSPC-SP11 a minimum of 4 inches either side of any area to be heated (torch cutting, sawing, grinding, etc.) in accordance with 29 CFR 1926.354. Abrasive blasting is prohibited.

Provide air supplied respirators in accordance with 29 CFR 1926.62 and 29 CFR 1910.134.

110-5.3 Asbestos Containing Materials (ACM) Not Identified Prior to the Work: When encountering or exposing any condition indicating the presence of asbestos, cease operations immediately in the vicinity and notify the Engineer.

Make every effort to minimize the disturbance of the ACM. Immediately provide for the health and safety of all workers at the job site and make provisions necessary for the health and safety of the public that may be exposed to any potentially hazardous conditions. Provisions shall meet all applicable laws, rules or regulations covering hazardous conditions and will be in a manner commensurate with the gravity of the conditions.

The Engineer will notify the District Contamination Assessment Coordinator who will coordinate selecting and tasking the Department's Asbestos Contractor or

Contamination Assessment/Remediation Contractor (CAR). Provide access to the potential contamination area. Preliminary investigation by the Asbestos/CAR Contractor will determine the course of action necessary for site security and the steps necessary to resolve the contamination issue.

The Asbestos/CAR Contractor will delineate the contamination area(s), any staging or holding area required. Coordinate with the Asbestos/CAR Contractor and the Engineer to develop a work plan that will provide the Asbestos/CAR Contractor's operations schedule with projected completion dates for the final resolution of the contamination issue.

The Asbestos/CAR Contractor will maintain jurisdiction over activities inside any outlined contaminated areas and any associated staging holding areas. The Asbestos/CAR Contractor will be responsible for the health and safety of workers within the delineated areas. Provide continuous access to these areas for the Asbestos/CAR Contractor and representatives of regulatory or enforcement agencies having jurisdiction.

Both Contractors will use the schedule as a basis for planning the completion of both work efforts. The Engineer may grant the Contract Time extensions according to the provisions of 8-7.3.2.

Cooperate with the Asbestos/CAR Contractor to expedite integration of the Asbestos/CAR Contractor's operations into the construction project. The Prime Contractor is not expected to engage in routine construction activities involving asbestos containing materials. Adjustments to quantities or to Contract unit prices will be made according to work additions or reductions on the part of the Prime Contractor in accordance with 4-3.

The Engineer will direct the Prime Contractor when operations may resume in the affected area.

110-6 Removal of Existing Pavement.

Remove and dispose of existing rigid portland cement concrete pavement, sidewalk, slope pavement, ditch pavement, curb, and curb and gutter etc., where shown in the plans or ordered by the Engineer to be removed or where required because of the construction operations. Retaining walls, drainage structures and flexible asphalt pavement are not included in the work under this Article.

110-7 Ownership of Materials.

Except as may be otherwise specified in the Contract Documents, the Contractor shall take ownership of all buildings, structures, appurtenances, and other materials removed by him and shall dispose of them in accordance with 110-9.

110-8 Disposal of Materials.

110-8.1 General: Either stack materials designated to remain the property of the Department in neat piles within the right-of-way or load onto the Department's vehicles.

Dispose of timber, stumps, brush, roots, rubbish, and other objectionable material resulting from clearing and grubbing in areas and by methods meeting the applicable requirements of all Local, State and Federal regulations. Do not block waterways by the disposal of debris.

110-8.2 Burning Debris: Where burning of such materials is permitted, perform all such burning in accordance with the applicable laws, ordinances, and regulations. Perform all burning at locations where trees and shrubs adjacent to the cleared area will not be harmed.

110-8.3 Timber and Crops: The Contractor may sell any merchantable timber, fruit trees, and crops that are cleared under the operations of clearing and grubbing for his own benefit, subject to the provisions of 7-1.2, which may require that the timber, fruit trees, or crops be burned at or near the site of their removal, as directed by the Engineer. The Contractor is liable for any claims which may arise pursuant to the provisions of this Subarticle.

110-8.4 Disposal of Treated Wood: Treated wood, including that which comes from bridge channel fender systems, must be handled and disposed of properly during removal. Treated wood should not be cut or otherwise mechanically altered in a manner that would generate dust or particles without proper respiratory and dermal protection. The treated wood must be disposed of in at least a lined solid waste facility or through recycling/reuse. Treated wood shall not be disposed by burning or placement in a construction and demolition (C&D) debris landfill. All compensation for the cost of

removal and disposal of treated wood will be included in the Cost of Removal of Existing Structures.

110-8.5 Hazardous Materials/Waste: Handle, transport and dispose of hazardous materials in accordance with all Local, State and Federal requirements including the following:

a. SSPC Guide 7
b. Federal Water Pollution Control Act, and
c. Resource Conservation and Recover Act (RCRA).

Accept responsibility for the collection, sampling, classification, packaging, labeling, accumulation time, storage, manifesting, transportation, treatment and disposal of hazardous waste, both solid and liquid. Separate all solid and liquid waste and collect all liquids used at hygiene stations and handle as hazardous materials/waste. Obtain written approval from the Engineer for all hazardous materials/waste stabilization methods before implementation.

Obtain an EPA/FDEP Hazardous Waste Identification Number (EPA/FDEP ID Number) before transporting and/or disposal of any hazardous materials/waste.

List the Department as the generator of all hazardous materials/waste.
Submit the following for the Engineers' approval before transporting, treatment or disposal of any
hazardous materials/waste:

a. Name, address and qualifications of the transporter,
b. Name, address and qualifications of the treatment facility,
c. Proposed treatment and/or disposal of all Hazardous Materials/Waste.

Transport all hazardous materials/waste in accordance with applicable 40 CFR 263 Standards. Provide a copy of all completed Hazardous Materials/Waste manifest/bills of lading to the Engineer within 21 days of each shipment.

110-8.5.1 Steel Members With Hazardous Coating: Dispose of steel members with hazardous coating in one of the following manners:

(a) Deliver the steel members and other hazardous waste to a licensed recycling or treatment facility capable of processing steel members with hazardous coating.

(b) Deliver the steel members with hazardous coating to a site designated by the Engineer for

(c) use as an offshore artificial reef. Deliver any other hazardous materials/waste to a licensed hazardous materials/waste recycling treatment facility.

Dismantle and/or cut steel members to meet the required dimensions of the recycling facility, treatment facility or offshore artificial reef agency.

All compensation for the cost of removal and disposal of hazardous materials/waste will be included in the Cost of Removal of Existing Structures.

110-8.5.2 Certification of Compliance: Furnish two copies of Certification of Compliance from the firm actually removing and disposing of the hazardous materials/waste stipulating, the hazardous materials/waste has been handled, transported and disposed of in accordance with this Specification. The Certification of Compliance shall be attested to by a person having legal authority to bind the company.

Maintain all records required by this Specification and ensure these records are available to the Department upon request.

110-9 Miscellaneous Operations.

110-9.1 Landscape Areas: When certain areas of the right-of-way, outside of the limits of construction, are shown in the plans or designated by the Engineer to be landscaped, either under the construction Contract or at a later time, remove undesirable trees, stumps, undergrowth, and vegetation, as directed, and preserve and trim natural growth and trees as directed by the Engineer.

110-9.2 Leveling Terrain: Within the areas between the limits of construction and the outer limits of clearing and grubbing, fill all holes and other depressions, and cut down all mounds and ridges. Make the area of a sufficient uniform contour so that the Department’s subsequent mowing and cutting operations are not hindered by irregularity of terrain. Perform this work regardless of whether the irregularities were the result of construction operations or existed originally.

110-9.3 Mailboxes: When the Contract Documents require furnishing and installing mailboxes, permit each owner to remove the existing mailbox. Work with the Local Postmaster to develop a method of temporary mail service for the period between removal and installation of the new mailboxes. Install the mailboxes in accordance with the Design Standards.

110-10 Method of Measurement.

110-10.1 Clearing and Grubbing: When direct payment is provided in the Contract, the quantity to be paid for will be the lump sum quantity.

110-10.2 Removal of Existing Structures: When direct payment is provided in the Contract, the quantity to be paid for will be the lump sum quantity or quantities for the specific structures removed, as designated.

110-10.3 Removal of Existing Pavement: Payment for removal of flexible asphalt pavement is included in the Lump Sum price for Clearing and Grubbing. When a separate item for Removal of Existing Pavement is provided, the quantity to be paid for will be the number of square yards of existing pavement of the types listed in 110-7, acceptably removed and disposed of, as specified. The quantity will be determined by actual measurement along the surface of the pavement before its removal. Measurements for appurtenances which have irregular surface configurations, such as curb and gutter, steps, and ditch pavement, will be the area as projected to an approximate horizontal plane. Where the removal of pavement areas is necessary only for the construction of box culverts, pipe culverts, storm sewers, inlets, manholes, etc., these areas will not be included in the measurements.

110-10.4 Delivery of Salvageable Material to the Department When direct payment is provided in the Contract, the quantity to be paid for will be the Lump Sum quantity for delivery of salvageable materials to the Department as indicated in the plans.

110-10.5 General: In each case, except as provided below, where no item of separate payment for such work is included in the proposal, all costs of such work will be included in the various scheduled items in the Contract, or under specific items as specified herein below or elsewhere in the Contract.

SECTION 112 - TREES, PLANTS, AND GROUNDCOVERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

Furnish all materials, equipment and labor as necessary for preparation of planting areas, soil treatment, planting of trees, shrubs, groundcovers and grass, relocation of designated plants, protection of plants, maintenance, guarantee and replacement of plants, and related items as required to complete the work as indicated on the drawings and specified herein.

1.2 DEFINITIONS:

A. The following words and terms or pronouns used instead shall wherever they appear in these specifications, be construed as follows, unless a different meaning is clear from the context:

"Final Acceptance" shall mean that point in time when all requirements of project drawings and specifications are completed, including any punch list items, to the satisfaction of the City. The contractor shall be notified in writing of final acceptance by the City.

"Warranty Period" shall be a one year period beginning at Final Acceptance.

"Maintenance Period" shall begin when plant material is installed and continue for thirty (30) days after notification of Final Acceptance.

"Final Maintenance Inspection" shall occur at the end of the thirty (30) day maintenance period.

1.3 QUALITY ASSURANCE:

A. The landscape installation shall be by a single firm specializing in landscape work.

B. Plant names indicated shall comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed shall conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

C. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock" (ANSI Z60 1) and, sizing and grading standards of the latest edition of "Grades and Standards for Nursery Plants: Part I and II" by the Florida Department of Agriculture and Consumer Services. All plant material shall be "Florida No. 1" or better.

1. Caliper measurement shall be taken six (6) inches above ground level if four (4) inches or less. If greater than 4 (four) inches, caliper measurement will be taken at twelve (12) inches above ground level.

D. Do not make substitutions. If specified landscape material is not obtainable submit to the City in writing, proof of non-availability and proposal for use of equivalent material.

E. All plants shall be nursery grown and 100% acclimatized to local planting conditions.

F. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25% are of the minimum size indicated and 75% are of the maximum size indicated. Height and spread specified will prevail over container size specified, for groundcover and shrub material only.

G. All trees will be inspected and approved by the City at the place of growth, for compliance with specification requirements for quality, size, and variety. When trees cannot be obtained locally, provide sufficient photographs of the proposed plants for approval.

1. Approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

2. Tag trees at the source of supply prior to inspection by the City.

1.4 SUBMITTALS:

A. Submit planting schedule showing scheduled dates for each type of planting in each area of site two weeks prior to beginning work.

B. Submit certificates of inspection, as required by governmental authorities; and manufacturers or vendors certified analysis for soil amendments, herbicides, insecticides and fertilizer materials; submit other data substantiating that materials comply with specified requirements.

C. Submit the following material samples:

1. Mulch
2. Topsoil with verification of sterilization and source.
3. One typical sample of each shrub and groundcover material as specified, prior to planting for approval.

   a. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

D. Upon final acceptance of plant material, submit two (2) written maintenance instructions recommending procedures for maintenance of plant materials for a one year period.

E. Provide landscape planting as-built drawings:
1. Legibly mark drawings to record actual installation.
2. Identify field changes of dimension and detail and changes made as directed by the City.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

B. Trees must be held and fully acclimatized over a period not less than eight (8) weeks prior to delivery to site.

C. Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. Spray deciduous plants in foliage with an approved "Anti-Desiccant" immediately prior to digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order. Upon arrival, the certificate shall be submitted to the City. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the City. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

D. Plant material that is stored improperly shall receive a special review established on a case by case basis.

E. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

F. Topsoil shall be kept dry and loose for planting bed mixes.

G. Label at least one (1) tree and one (1) shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common names.

1.6 JOB CONDITIONS:

A. Work notification: Notify the City at least seven (7) working days prior to installation of plant material. All plant samples shall be reviewed for approval prior to notification.

B. Protect existing utilities, paving and other facilities from damage caused by landscaping operations. Notify any affected utilities 48 hours prior to beginning work, if applicable.

C. A complete list of plants, including a schedule of sizes, quantities, and other requirements are shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

D. Examine the subgrade, verify the elevations, observe the conditions under which work is to be performed, and examine unsatisfactory conditions before proceeding with the work.

1. When conditions detrimental to plant growth are encountered such as rubble fill, adverse drainage conditions or obstructions, notify the City before planting to determine alternative action.

2. Contractor shall be responsible for the removal of existing vegetation deemed necessary by the City to carry out the scope of the project.

E. The irrigation system shall be installed prior to planting, if applicable. Locate, protect and maintain the irrigation system during planting operations. Repair irrigation system components, new and existing, damaged during planting operations. Test system prior to installation of plant material.

F. Any work taking place along a city, county or state road or median must comply with appropriate regulating authorities guidelines for "Traffic Controls for Construction and

Maintenance Operations". Contractor shall be responsible to file and obtain any and all required agency permits.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Plants: Provide plants typical of their species or variety; with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasion of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces.

1. All plant material shall be "Florida No. 1", or better.

2. Dig balled and burlapped plants with firm, natural balls of earth of diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standard for Nursery Stock". Cracked or mushroomed balls are not acceptable.

3. Container-grown stock: Grown in container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.

   a. No plants shall be loose in container.
   b. Container stock shall not be pot bound.

4. Trees that have the main trunk forming a "Y" shape are not acceptable. Trees shall have a minimum of five (5) feet of trunk free from branching, unless otherwise specified.

5. Sanding of palm tree trunks will not be accepted. Palm tree fronds shall be tied up to protect the bud from stress and damage. Fronds shall be tied with a material that will decompose naturally.

6. Plants planted in rows shall be matched in form.

7. Plants larger than those specified in the plant list may be used when approved by the City.

a. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

8. The height of the tree, measured from the crown of the roots to the average height of the top of the tree, shall not be less than the minimum size designated in the plant list. Container size designated, if any, shall be the minimum size required.

9. No pruning wounds shall be present with a diameter of more than 1" and such wounds must show vigorous bark on all edges.

10. Height and spread requirements, of shrub and groundcover material, indicated in the plant list shall prevail over container size indicated, unless otherwise specified.

11. Shrubs and small plants shall conform to the following standards:

a. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.

b. Single stemmed or thin plants will not be accepted.

c. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground, unless otherwise specified.

d. Plants shall be in a vigorous condition, free from dead wood, bruises, or other root or branch injuries.

12. Any plant material showing signs of shock will be judged on a case by case basis for acceptance or rejection.

2.2 ACCESSORIES:

A. Refer to drawings and other portions of specifications for accessories specifically used on this project.

PART 3 - EXECUTION

3.1 INSPECTION:

Contractor shall examine proposed planting areas and conditions for installation. Do not start

planting work until unsatisfactory conditions are corrected.

3.2 PREPARATION:

A. Time of planting.

1. Deciduous material: If deciduous trees are planted in-leaf, they shall be sprayed with an anti-desiccant prior to planting operation.

B. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.

C. Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas, then secure the City's acceptance before start of planting work. Give 24 hour notice for inspection. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected. Verify locations of existing utilities.

D. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Provide shrub pits at least 12" greater than the diameter of the root system and 3 times greater than diameter of rootball for trees. Depth of pit shall accommodate the root system. Scarify the bottom of the pit to a depth of 4". Remove excavated materials from the site, as specified and directed by the City.

E. Provide pre-mixed planting mixture for use around the balls and roots of the plants consisting of topsoil and 1/2 lb. plant fertilizer as specified, for each cu. yd. of mixture.

F. Provide pre-mixed ground cover bed planting mixture consisting of topsoil and 1/2 lb. plant fertilizer as specified, per cu. yd. Provide beds a minimum of 8" deep. Excavate groundcover beds 4" deep, add planting mixture and fill to a depth of 8". If slopes are greater than 4 to 1 increase depth to 12".

G. Palm trees with clear trunk greater than six (6) feet in height shall be backfilled with soil indigenous to the site.

3.3 INSTALLATION:

A. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent

structure. Set plant material 2-3" above the finished grade. No filling will be permitted around trunks or stems. Backfill the pit with half indigenous soil to the site and half planting mixture until approximately 2/3 full, then water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Do not use muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water.

After balled and burlapped plants are set, place soil mixture around bases of balls and fill all voids.

1. Remove all burlap, ropes, and wires from the tops of balls.

B. Space groundcover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 4" of the trunks of trees and shrubs within planting bed and to within 6" edge of bed.

C. Care of Existing Trees:

1. All existing trees, if any, shall be protected through the duration of this project as outlined in the Tree Protection Standards of the City of Tampa Site Clearing Ordinance. These requirements and those attached at the end of this section are available in the City Hall Annex Building, 3rd floor east, Duplication Office for a fee.

D. Tree Relocation:

1. Tree relocation shall be performed under the supervision of the City Arborist.

3.4 MAINTENANCE:

A. Begin maintenance immediately after planting. Maintain all plant material until final acceptance and for an establishment period of thirty (30) days after final acceptance.

B. Maintenance shall include but is not limited to pruning, cultivating, mowing, weeding, fertilizing, watering, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.

2. Tighten and repair guy wires and stakes as required.

3. Correct defective work immediately after deficiencies become apparent and weather permits.

4. In addition to irrigation system, water trees every other day saturating the soil to a depth of three (3) feet for the first two (2) weeks. If no irrigation system exists, water plant material per the following schedule:

   1-30 days - water every other day, saturating the soil to a depth of three (3) feet.

   30-90 days - water twice a week, saturating the soil to a depth of three (3) feet.

   90-365 days - water once a week, saturating the soil to a depth of three (3) feet.

   Quantity of water applied should be adjusted in accordance to rainfall.

3.5 ACCEPTANCE:

A. Inspection to determine acceptance of planted areas will be made by the City upon Contractor's request. Provide notification at least five (5) working days.
   1. Planted areas will be accepted provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy, vigorous condition.

B. The City will prepare a "punch list" of those items which must be corrected before reinspection for final acceptance. The City will determine an appropriate time period in which punch list items must be corrected. Provide 48 hour notification of need for reinspection.

C. The City will assume plant maintenance 30 days after final acceptance, at which time, the contractor shall request a final maintenance inspection for acceptance, where requirements as stated in 3.5 apply.

3.6 WARRANTY:

A. Warrant plant material to remain alive and be in a healthy, vigorous condition for a period of one (1) year after completion and final acceptance of entire project.

B. Replace, in accordance with the drawings and specifications, all plants that are dead or as determined by the City to be in an unhealthy or unsightly condition, and have lost their natural shape due to Contractor's negligence. The cost of such replacement(s) shall be at Contractor's expense. Warrant all replacement plants for one (1) year after final acceptance.

C. Warranty shall not include damage or loss of trees, plants, or groundcovers caused by fires, floods, freezing, rains, lightning storms or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of planting area; and acts of vandalism.

D. Remove and replace immediately all plants found to be dead or in unhealthy condition as determined by the City at any time during warranty period. Make replacements within four (4) weeks of notification.

1. An inspection will be conducted at the end of the warranty period. Contractor will replace any plants found to be dead or in poor condition at this time within four (4) weeks of inspection. Contractor will also remove any tree bracing or guying determined by the City to be unnecessary at this point in the tree's development.

3.7 CLEANING

Perform cleaning during installation of the work and upon completion of work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from planting operations.

SECTION 113 – DISPOSAL OF DEBRIS

W-113.01 General

The Contractor shall furnish all labor, materials and equipment required to transport and dispose of debris removed from all pipelines and structures to an approved facility at the Contractor's expense. Any permits required for the hauling and disposing of materials shall be obtained by the Contractor at their expense.

W-113.02 Scope of Work

The Contractor will have the following responsibilities:

a. Be solely responsible to handle, transport, test, permit and dispose of debris in accordance with all applicable regulatory requirements.

b. For transportation between project site and disposal site.

c. To apply for, pay fees and obtain all required environmental or transportation permits prior to handling debris. Permitting agencies include, but are not limited to, EPA, DER, DOT, Hillsborough County, City of Tampa and Expressway Authority.

d. To perform all necessary tests as required by permit and all applicable regulatory requirements.

e. To select a disposal site and acquire approval from the disposal site owner for disposal of debris. The Contractor is responsible to pay all applicable disposal fees.

SECTION 115 - TREE PRUNING

W-115.01 General

This section covers pruning of excess growth, diseased, dead and weakened portions from trees in order to allow access to facilities by maintenance personnel and provide safe working conditions.

W-115.02 Permits

The Contractor is responsible for obtaining all pruning permits. Permits must be obtained by the Contractor prior to conducting work for all branches four (4) inches in diameter and over. Permit applications are available through the Parks & Recreation Department. (See procedures outlined in the City's Tree and Landscape Ordinance.)

Permit fees will be waived for all work performed on City property and rights-of-way.

W-115.03 Utilities

Where trees are in proximity to power lines, the Contractor is responsible for coordinating work through Tampa Electric Company. The Contractor must comply with ANSI standards and maintain a minimum of ten (10) feet from electrical conductors.

W-115.04 Response Time

The Contractor must be available to service emergency calls (e.g., trees down in street, etc.) seven (7) days a week, twenty-four (24) hours a day. The response time for emergencies must be within one (1) hour.

Mandatory Contractor response and completion time will be seventy-two (72) hours per standard work and twenty-four (24) hours (fully completed work) per emergency. A contact person and phone number must be identified at all times.

W-115.06 Equipment

The Contractor must own or have means to rent heavy equipment necessary in conducting described tree activities (e.g., crane, bucket trucks, dump trucks, etc.). Proof of credit line or other

financial means may be required. Fleet size and availability shall be as approved by the Engineer.

All tools must be sterilized prior to beginning work on each tree serviced.

SECTION 425
STORMWATER INLETS, MANHOLES AND JUNCTION BOXES

W-425.01 General

The work specified in this section consists of the construction of inlets, manholes, junction boxes, shoulder gutter inlets, and yard drains. These structures shall be of reinforced concrete or may be of brick masonry if circular and constructed in place and shall include the necessary metal frames and gratings. The work under this section shall also include the adjustment of those structures shown in the plans to be adjusted or which are required to be adjusted for the satisfactory completion of the work. The new structures shall be constructed in conformity with the plans and in accordance with these specifications.

In general, curb and grate inlets shall be constructed in accordance with the Stormwater Engineering Division Standard Details and manholes and junction boxes shall be constructed in accordance with FDOT Standard Plans.

W-425.02 Composition and Proportioning

Concrete: Unless otherwise shown in the plans, all concrete for these structures shall be Class II as specified in FDOT Standard Specification 346 – Portland Cement Concrete.

Mortar: The mortar for brick masonry shall be of portland cement and sand, mixed in the proportions of one part cement to two parts of sand. Miami Oolitic rock screenings may be substituted for the sand upon prior approval of the Engineer. All the materials shall pass the No. 8 Sieve, and be uniformly graded from coarse to fine. At the option of the Contractor, hydrated lime, in an amount not to exceed ten percent of the amount of cement used, may be added to the mortar.

As an alternate to the above, masonry cement may be used in lieu of the above-specified mortar provided that it is delivered in packages properly identified by brand name of manufacturer, net weight of package, and whether it is Type 1 or Type 2, and further provided that it has not been in storage for a period greater than six months. Hydrated lime shall not be used with masonry cement.

The sand and cement shall be thoroughly mixed dry in proper boxes or mortar mixers and such quantity of clean fresh water added as will provide a stiff mortar of the proper consistency. The whole mass shall be thoroughly mixed until used. Any mortar that has set shall not be retempered in any way, and no mortar shall be used more than one and one-half (1-1/2) hours

after mixing.

W-425.03 Gratings, Covers and Frames

Use gratings and frames fabricated from structural steel or cast iron. Gratings and frames fabricated from structural steel shall be galvanized in accordance with the requirements of ASTM A123 or shall be painted with two coats of prime meeting the requirements of Section 971-8 of the Standard F.D.O.T. Specifications for Road and Bridge Construction, followed by one coat of material meeting the requirements of Federal Specification TT-E-489, Class A Black. All paint may be applied in the shop, by dipping, provided that each coat is thoroughly dry before the succeeding coat is applied. These requirements do not apply when A-588 steel is used.

Use rigid frames and covers either 24-inches or 36 inches, as indicated on the plans.

When Alternate "G" grates are specified, the chain, bolt, nuts, and cold shuts shall be galvanized after fabrication in accordance with the requirements of ASTM A 123.

W-425.04 Forms

Forms shall be of wood or metal, so designed and constructed that they may be removed without injury to the concrete. They shall be built true to line and grade and braced in a substantial and unyielding manner, and shall be approved by the Engineer before being filled with concrete.

W-425.05 Precast Inlets, Manholes, and Junction Boxes

Careful attention shall be given to the proper construction or reconstruction of the pavement adjacent to the gutters and at street intersections to obtain satisfactory drainage to the inlets from the intersecting streets.

The Contractor may request to substitute precast inlets, manholes, and junction boxes in lieu of cast-in-place units unless otherwise shown in the plans or directed by the Engineer. At locations not so restricted, the Contractor shall carefully examine the plan details at each structure to determine if use of a precast unit is feasible. The design and fabrication of precast units shall be in accordance with the Stormwater Engineering Division Standard Details and/or FDOT Standard Plans, as appropriate.

Smooth welded wire fabric may be substituted for deformed re-bar or welded deformed wire reinforcement in non-circular precast drainage structures provided the following requirements are met:

1. The smooth welded wire fabric shall comply with ASTM A-185.

2. Substitution of equal areas of smooth wire fabric for the reinforcing steel and provided the width and length of the unit is four times the width of the spacing of the cross wires.

3. Wire shall be continuous around the box and spliced at a quarter point of one side with an overlap of not less than the spacing of the cross wires plus two inches.

W-425.06 Construction Methods

Excavation: Excavation shall comply with the requirements specified in Section 1.

Placing and Curing Concrete: The concrete shall be placed in the forms, to the depth shown in the plans and thoroughly vibrated. After the concrete has hardened sufficiently, it shall be covered with suitable material approved by the Engineer, and kept moist for a period of three days.

Setting Manhole Castings: After the concrete has been cured as specified above, the frame of the casting shall be set in a full mortar bed composed of one part portland cement to two parts of fine aggregate.

Reinforcing Steel: The construction methods for the steel reinforcement shall be as specified in Section 6.

Laying Brick: All brick shall be saturated with water before being laid. The brick shall be laid by the shovejoint method so as to bond them thoroughly into the mortar. Headers and stretchers shall be so arranged as to bond the mass thoroughly. Joints shall be finished properly as the work progresses and shall be not less than 1/4 inch or more than 3/4 inch in thickness. No spalls or bats shall be used except for shaping around irregular openings or when unavoidable at corners.

The inside of the brick masonry walls shall be plastered uniformly with cement mortar one-half (1/2) inch in thickness mixed in proportions of one part of cement and two parts of clean, sharp sand.

Placing Pipe: Inlet and outlet pipes shall be of the same size and kind as the connecting pipe shown in the plans. They shall extend through the walls for a distance beyond the outside surface sufficient for the intended connections, and the concrete shall be constructed around

them neatly so as to prevent leakage along their outer surface. The inlet and outlet pipes shall be flush with the inside of the wall.

Backfilling: Backfilling shall conform with the requirements specified in Section 2.

Adjusting Existing Structures: Existing manholes, catch basins, inlets, valve boxes, monument boxes, etc., within the limits of the proposed work, that do not conform to the finished grade of the proposed pavement, or to the finished grade designated on the plans for such structures, shall be cut down or extended, and made to conform to the grade of the new pavement, or to the designated grade of the structure if outside of the proposed pavement area. The materials and construction methods for this work shall conform to the requirements specified above.

Where manholes are to be raised, the adjustment may, at the Contractor's option, be made by the use of adjustable extension rings of the type which do not require the removal of the existing manhole frame. The extension device shall provide positive locking action and shall permit adjustment in height as well as diameter. The particular type of device used shall meet the approval of the Engineer.

Adjusting Structures: When an item of payment for adjusting manholes, valve boxes, inlets, or monument boxes is provided in the proposal, the number of such structures designated to be paid for under separate items, and which are satisfactorily adjusted, shall be paid for at the contract units prices each for Adjusting Inlets, Adjusting Manholes, Adjusting Valve Boxes, and Adjusting Monument Boxes.

For any of such types of these structures required to be adjusted but for which no separate item of payment is shown in the proposal for the specific type, payment shall be made under the item of Adjusting Miscellaneous Structures.

W-425.07 Drainage Structures

1. All inlets, manholes, and junction boxes shall, unless otherwise directed by the Engineer, be constructed as per design plans and applicable design standards. All manholes shall be Traffic Bearing type. It shall be the responsibility of the Contractor to assure that the designated sizes of the drainage structures meet the following criteria:

    a. The minimum distance from the top of the opening for the highest pipe to the bottom of the top slab shall be ten inches (10"); 12 inches from top of pipe to bottom of top slab, before "stack" is used.

b. The minimum diameter for stack heights shall be thirty-six (36) inches.

c. The minimum distance between pipe openings shall be nine (9) inches.

d. For four-sided structures having openings in more than one corner, individual shop drawings must be submitted for prior approval.

2. If warranted by field conditions and directed by the Engineer, the Contractor shall, at such locations, construct brick drainage structures (in place of concrete drainage structures), according to the standards specified below:

Brick construction shall be as follows:

a. Wall thickness minimum eight inches (8") up to eight feet (8') height, unless specified otherwise.

b. Wall thickness minimum twelve inches (12") up to twelve feet (12') height, unless specified otherwise.

c. Brick shall be laid in 1:2 (Portland cement-sand) mortar.

d. Before laying the bricks in mortar, the bricks shall be thoroughly sprinkled with clean water (not to saturation extent).

e. Brick for manhole and inlet structures shall be laid in stretcher courses, with every sixth course a header course.

f. All brick structures shall be plastered smooth inside also with 1/2-inch thick, 1:2 (Portland cement-sand) mortar.

g. No "unsound" brick shall be used. As a test, if a light hammer blow, with the brick held lightly in hand, does not produce a uniform crisp ringing sound, the brick shall be construed to have crack(s), or otherwise unsound and shall be rejected.

h. All bricks shall be solid.

3. No additional compensation shall be paid for brick structures. Brick and concrete shall not be used simultaneously in drainage structure walls. Walls of round structures shall be constructed of concrete only.

4. For all types of manholes, the top and bottom slab shall be as per applicable D.O.T. standards, even if brick is allowed to be used in the manhole walls. The following criteria shall apply to slab thicknesses and steel reinforcements:

a. Top and bottom slabs shall have same thicknesses and reinforcements in any manhole structure.

b. The minimum slab thickness and reinforcement shall be 8 inches thick and #6 bars at 6-inch centers both ways.

c. 4-foot by 6-foot (4' x 6') or larger manholes, including circular manholes with inside diameter of 5-feet (5.0') or larger, shall have 10-inch thick slabs with #7 bars at 6-inch centers both ways.

d. Unless specified on the Plans, four-sided structures with both inside dimensions in excess of eight feet (8.0') and circular structures with inside diameter in excess of eight feet (8.0') shall not be covered by D.O.T. and the above criteria.

5. All grate inlets shall conform to the City of Tampa design standards.

6. Grates on inlets, as well as all other structures, shall be Traffic Bearing Type, unless specified otherwise, and subject to approval of the Engineer. All grate inlets shall be fitted with an approved metal frame at the top to seat the grates.

7. All Type-P manholes shall be bid at one average unit price regardless of size and shape. Similarly, all Type-J manholes will be bid at one average unit price regardless of size and shape unless indicated otherwise in the proposal.

8. The reinforcements and shapes for all drainage structures, unless directed by the Engineer otherwise, shall conform to the Plans and applicable design standards.

9. Vertical support columns (one in case of Type 5 inlet) shall be constructed by the Contractor, as a part of the D.O.T. Type 5 and 6 curb inlets, where and as directed by the Engineer.

10. The Contractor, if so directed by the Engineer in order to better meet site requirements, shall construct B-S-1, B-R-2, B-V-1, or B-R-1 type curb inlets in lieu D.O.T. Type 5 and 6 inlets and vice-versa without additional cost to the City. P-5 and P-6 inlets shall have 3-1/2-foot by 3-1/2-foot substructures unless oversize pipe is to be

accommodated or otherwise directed by the Engineer. Legible, detailed plans of each inlet type shall be provided to the Contractor.

Side openings in curb and grate type inlets may be specified in the Plans or by the Construction Engineer to meet site conditions. The Contractor shall provide such openings without any additional cost.

11. When precast drainage structures are requested as substitutions for poured in place concrete structures, the Contractor shall meet the following additional requirements:

a. Minimum height of the base structure (manhole or inlet barrel), unless restricted by design, shall be 5 feet 0 inches before extending the structure height by another precast "barrel." The minimum height of the top (extension) precast "barrel" shall be 1 foot 6 inches. "Barrel" extensions of less than 1-foot 6-inch height shall be cast in place with continuous reinforcement.

b. Four-sided structures may be considered as an alternate to circular structures, but not the reverse.

c. For substructures for the City-type curb inlets, unless specified otherwise, directed by the Engineer, or to accommodate larger pipes, the Contractor may use a 3-foot by 4-foot (inside dimensions) structure. This structure shall have same slab and wall thicknesses and steel reinforcing as specified for "Type E" grate inlet.

d. When circular structures are precast in accordance with ASTM C-478, minimum wall thickness shall be six inches (6") thick or as specified in ASTM C-478 for larger diameter structures.

e. The location of the pipe holes and adequate basic substructures height, unless directed otherwise by the Engineer, shall be the responsibility of the Contractor.

f. The Contractor shall submit shop drawings only as specified below:

(1) One each-typical for different type of structures.

(2) For structures directed by the Engineer, and/or requiring change with respect to design plans, or as otherwise required by these specifications.

g. Provide schedule of manufacture of the structures. No compensation shall be paid to the Contractor for unusable precast drainage structures.

h. Provide material testing acceptance reports by a licensed private laboratory verifying:

(1) that the structures were constructed in accordance with details shown on the Plans and/or Shop Drawings;

(2) the exact design criteria adhered to; if more than one, identify which criteria applies to which structures;

(3) the project title, project number, file number, date cast, structure, plan sheet number and station;

(4) reinforcement size, spacing and amount;

(5) concrete placement, curing and strength, and verification of concrete cover on reinforcement; and

(6) that the testing laboratory stamp is placed on each structure prior to shipment.

i. Cooperate with Department personnel regarding periodic inspection of the precast units and the precast operations.

12. All manhole and inlet structures shall be set on a minimum 6-inch thick layer of compacted number 57 size coarse aggregate unless noted otherwise in the Plans or Specifications, or unless the Engineer determines a thicker layer is required due to soil and/or water conditions. All such coarse aggregate shall be completely enveloped in non-woven filter fabric as directed by the Engineer.

Payment for the 6-inch thick layer of stone shall be included in the price of the structure. Payment for thicker layers of stone shall be made from the select bedding material (stone) pay item, if available, or as extra work.

13. All casting covers for inlets and manholes shall bear the appropriate City of Tampa identification for storm sewers and for sanitary sewers, as shown on the Plans, Standard Details and directed by the Engineer.

SECTION 430
PIPE CULVERTS AND STORM SEWERS

W-430.01 General

The work specified in this section consists of furnishing and installing storm sewer pipe and end sections of the particular types, sizes, and dimensions shown in the plans and in conformity with the lines and grades given, and the furnishing and construction of such joints and connections to existing pipes, catch basins, inlets, manholes, walls, etc., as may be required to complete the work as indicated in the plans.

W-430.02 Laying Pipe

General: Each section of pipe shall be inspected for defects before being lowered into the trench. All pipe shall be carefully laid, true to line and grade, with bells upgradient and tongue end fully inserted into the bell of the downgradient pipe. When pipe with quadrant reinforcement, or circular pipe with elliptical reinforcement, is used, the pipe shall be installed in a position such that the manufacturer's marks designating "top" and "bottom" of the pipe shall not be more than five degrees from the vertical plane through the longitudinal axis of the pipe. Do not allow departure from and return to plan alignment and grade to exceed 1/16 inch per foot of nominal pipe length, with a total of not more than 1 inch departure from theoretical line and grade. Take up and relay any pipe that is not in true alignment or which shows any settlement after laying without additional compensation.

Do not use concrete pipe with lift holes except round pipe which has an inside diameter in excess of 54 inches or any elliptical pipe.

Repair lift holes, if present, with hand-placed, stiff, non-shrink, 1-to-1 mortar of cement and fine sand, after first washing out the hole with water. Completely fill the void created by the lift hole with mortar. Cover the repaired area with a 24 inch by 24 inch piece of filter fabric secured to the pipe.

Trench Excavation: The excavation of the trench for pipe culverts and storm sewers shall be as specified in Section 1.

Foundation: Where the foundation material is of inadequate supporting value, a suitable foundation shall be provided, as directed by the Engineer, by the removal of unsuitable material and replacing with suitable material as specified in Section 2. Where in the Engineer's opinion, the removal and replacement of unsuitable material is not practicable, he may direct alternates in the design of the pipeline, as required to provide adequate support. Minor changes in the grade or alignment will not be considered as an adequate basis for extra compensation.

Pipe shall not be laid on blocks or timbers, or on other unyielding material, except where

the use of such devices is called for in the plans.

Backfilling: The backfilling around the pipe shall be as specified in Section 2.

Plugging Pipe: When so shown in the plans, the ends of the pipe culverts shall be sealed with a masonry plug a minimum of eight (8) inches in thickness unless otherwise shown in the plans.

End Treatment: The end treatment required at each cross drain, side drain, or storm sewer pipe end is shown in the plans. Alternate types are permitted only when shown. Details for each type of end treatment are contained in the FDOT Standard Plans.

Metal pipe Protection: To protect corrugated steel or aluminum pipe embedded in a concrete structure, such as an inlet, manhole, junction box, endwall, or concrete jacket, a bituminous coating shall be applied to the surface area of the pipe within and 12 inches beyond the concrete or mortar seal prior to sealing.

The surface preparation, application methods (dry film thickness and conditions during application), and equipment used shall be in accordance with the coating manufacturer's published specifications.
All coating products used must be approved by the Engineer.

W-430.03 Removing and Relaying Existing Pipe

Removal: If the plans indicate that existing pipe is to remain the property of the City, all existing pipe or pipe arch so indicated in the plans to be removed or that does not conform to the lines and grades of the proposed work and that is not to be relaid, shall be taken up and stacked neatly along the right of way, as directed by the Engineer. Due care shall be exercised to prevent damage to salvageable pipe during removal and stacking operations.

Relaying: Where so shown in the plans, existing culvert pipe shall be taken up and cleaned and shall be relaid in the same manner as specified for new culvert pipe. Where necessary, existing metal pipe or pipe arch shall be straightened before it is relaid.

W-430.04 Placing Pipe Under Railroad

General: Pipe culverts to be constructed under railroad tracks shall be constructed in accordance with the requirements of the railroad company either listed in the Specific Provisions or as stated in the permit or approval conditions.

W-430.05 Specific Requirements for Concrete Pipe

Sealing Joints:

(1) Round Concrete Pipe: For all round concrete pipe, the pipe joints shall be sealed by the use of round rubber gaskets. When rubber gaskets are used, the pipe joints shall meet the requirements specified in Section W-941.05. The gasket and the surface of the pipe joint, including the gasket recess, shall be clean and free from grit, dirt, and other foreign matter at the time the joints are made. In order to facilitate closure of the joint, application of an approved vegetable soap lubricant immediately prior to closing of the joint will be permitted.

Laying Requirements for Concrete Pipe with Rubber Gasket Joints: For concrete pipe laid with rubber gasket joints, any deviation from true alignment or grade which would result in a displacement from the normal position of the gasket of as much as 1/4 inch, or which would produce a gap exceeding 1/2 inch between sections of pipe for more than 1/3 of the circumference of the inside of the pipe, will not be acceptable and where such occurs the pipe shall be relaid without additional compensation. Where minor imperfections in the manufacture of the pipe cause a gap greater than 1/2 inch between pipe sections, the joint will be acceptable provided the gap does not extend more than 1/3 the circumference of the inside of the pipe. No mortar, joint compound, or other filler which would tend to restrict the flexibility of the gasket joint shall be applied to the gap.

Field Joints for Elliptical Concrete Pipe: Field joints for elliptical concrete pipe will be detailed in the plans or may be made with a preformed plastic gasket material. Pipe to be laid with joints made from preformed plastic material shall be subject to the following requirements:

(1) General: Installation shall be in accordance with the manufacturer's instructions and these specifications. The Contractor shall be responsible for obtaining a permanent watertight joint.

(2) Material: The preformed gasket material shall conform to the requirements of Section W-942.02.

(3) Joint Design: The pipe manufacturer shall furnish the Engineer with details in regard to configuration of the joint and the amount of gasket material required to effect a satisfactory seal. Joint surfaces which are to be in contact with the gasket material shall not be brushed or wiped with a cement slurry. Minor voids may be filled with cement slurry provided that all excess cement slurry is removed from the joint surface at the point of manufacture.

(4) Primer: Prior to application of the gasket material, a primer of the type

recommended by the manufacturer of the gasket material shall be applied to all joint surfaces which are to be in contact with the gasket material. The surface to be primed shall be thoroughly cleaned and dry when the primer is applied.

(5) Application of Gasket: Prior to placing a section of pipe in the trench, gasket material shall be applied to form a continuous gasket around the entire circumference of the leading edge of the tongue and the groove joint in accordance with the detail entitled "Detail for Application of Gasket Material (Before Joint Pull-Up)." The paper wrapper on the exterior surface of the gasket material shall be left in place until immediately prior to joining of sections. The gasket material shall be checked to assure that it is bonded to the joint surface, immediately prior to placing a joint in the trench. Plastic gasket material shall be applied only to surfaces which are dry. A hand heating device shall be kept at the job site to dry joint surfaces immediately before application of the plastic gasket material. When the atmospheric temperature is below 60 degrees F., plastic joint seal gaskets shall either be stored in an area warm to above 70 degrees F., or artificially warmed to this temperature in a manner satisfactory to the Engineer.

(6) Installation of Pipe: Handling of a section of pipe after the gasket material has been affixed shall be carefully controlled to avoid displacement of gaskets or contamination of gasket material with dirt or other foreign material. Any gasket displaced or contaminated in handling of the pipe shall be removed and repositioned or replaced as directed. The pipe shall be installed in a dry trench. The bottom of the trench shall be carefully shaped so as to minimize the need for realignment of sections of pipe after they are placed in the trench. Care shall be taken to properly align each section of pipe prior to the gaskets coming into contact. Realignment of a joint after the gaskets come into contact tends to reduce the effectiveness of the seal and shall be held to a minimum. When the pipes are joined, the entire joint shall be filled with gasket material and there shall be evidence of squeeze-out of gasket material for the entire internal and external circumference of the joint. Excess material on the interior of the pipe shall be trimmed to provide a smooth interior surface. After the pipe is in its final position, the joint shall be carefully examined to determine that the gasket material is satisfactorily adhering to all surfaces of the joint and that the entire joint is filled with gasket material. If a joint is defective, the leading section of pipe shall be removed and the joint resealed.

W-430.06 Field Joints for Aluminum Pipe

General: Field joints for aluminum pipe shall be made with bands fabricated of the same alloy as the culvert sheeting and shall meet the requirements of AASHTO M 196.

Aluminum Cross Drains, Storm Sewers, and Gutter Drains: The provisions specified above for corrugated steel pipe for these installations shall apply also to aluminum pipe (for circular and

helical corrugations) except that the material used in the bands and band connections for the alternate combination of joint materials shall be fabricated of the same alloy as the culvert sheeting.

W-430.07 Final Pipe Inspection

Upon placement of the roadway base material, but prior top placement of the asphalt or concrete pavement, Contractor shall dewater the installed pipe and provide the Engineer with a video recording of the system. For all pipes regardless of size and length, Contractor shall provide the Engineer a video DVD and report. Contractor shall allow sufficient time for the pipe video inspection and submittal of the reports to the Engineer for review prior to continuation of pavement.

Video report shall consist of a high quality DVD in a MPEG2 format video with a standard resolution of 720 x 480. Use a camera with lighting suitable to allow a clear picture of the entire periphery of the pipe. 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 and 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. The video will include identification before each section of pipe filmed. The identification will include the project number, the structure number corresponding to the structure number on the set of plans for the project, size of pipe, the date and time, and indicate which pipe is being filmed if multiple pipes are connected to the structure. Notes should be taken during the video recording process. Provide the Engineer with copies of these notes along with the video.

Move the camera through the pipe at a speed not greater than 30 feet per minute. Mark the video with the distance down the pipe. The distance shall have an accuracy of one foot per 100 feet. Film the entire circumference at each joint. Stop the camera and pan when necessary to document defects.

SECTION 555 - CHAIN LINK FENCING

W-555.01 General

The work specified in this section consists of furnishing and erecting FDOT Type B galvanized steel fencing with schedule 40 pipe posts at the locations shown on the Plans and as directed by the Engineer. Chain link fabric and posts shall be either Zinc Coated Steel or Polyvinyl Chloride (PVC) Coated Steel, as indicated in the plans.

Posts, fabric, and all other accessories shall be galvanized steel and conform to the requirements of Section 550 of the FDOT Standard Specifications for Road and Bridge Construction, latest edition.

W-555.02 Installation

The fence installation shall be in accordance with FDOT Standard Drawing Index No. 550-002 FENCE TYPE B, these specifications, and as directed by the Engineer.

W-555.03 Spacing of Posts

Posts shall be spaced as shown on the FDOT Standard Drawings, within a tolerance of 12 inches, except where definite spotting of corner or gate posts is required. In any line of fence, however, the over-spacings and the under-spacings shall approximately compensate. Additional line posts shall be set at abrupt changes in grade.

W-555.04 Construction Over Irregular Terrain and Other Obstructions

The bottom of the fence shall, in general, follow the contour of the ground. The fence is detailed on the FDOT Standard Drawings at approximately 3 inches above ground line. Over irregular ground, however, a minimum clearance of 1 inch and a maximum of 6 inches will be permitted for a length not to exceed 8 feet. At locations where these clearances cannot be met, the Engineer may require that posts of additional length be set and that the opening at the bottom be closed by barbed wire, stretched taut between poles, with no vertical distance between wires greater that 3 inches.

W-555.05 Setting Posts

All posts shall be set in a concrete base as shown in the FDOT Standard Drawing or on a base plate if the post is to be mounted on an existing concrete endwall or retaining wall, or in grout.

If rock occurs within the required depth of the post hole, or pavement which is to remain exists at the location of a post, a hole a diameter slightly larger than the greatest dimension of the post shall be drilled and the post grouted in.

W-555.06 Top Rail

A top rail shall be required in lieu of a top tension wire for all fencing.

W-555.07 Placing Fabric

Fence fabric shall not be placed until the posts have been permanently positioned and concrete foundations have attained adequate strength. The fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making permanent attachments at intermediate points. The fabric shall be fastened to all end, corner, and pull posts by approved stretcher bar assemblies. Fastening shall be done by use of tools designed for the purpose, in accordance with the manufacturer's recommendations. The tension for stretching shall be applied by mechanical fence stretchers designed for the purpose.

All splices in the fabric shall be securely and neatly made.

W-555.08 Electrical Grounds

Whenever a power line passes over the fence, a ground shall be installed directly below the point of crossing. The ground rod shall consist of an aluminum or galvanized rod, with connection of similar metal if required, or of other appropriate material, 8 feet in length and at least 5/8 inch in diameter. The rod shall be driven vertically until the top of the rod is approximately 6 inches below the ground surface. A No. 6 conductor shall be used to connect the rod and all fence elements. The conductor shall be connected to each fence element and the ground rod by means of electrical-type clamps which will prevent corrosion.

W-555.09 Gates

The gate for the station site driveway shall be a CANTILEVER SLIDE GATE TYPE B FENCE meeting the requirements of FDOT Standard Plan 550-003, Index 803. Gate opening shall be 12 feet.

SECTION 2930 - SODDING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide sodded lawns as shown and specified. The work includes:

1. Soil preparation.
2. Sodding lawns, and other indicated or disturbed areas.
3. Maintenance.

B. Related Work:
1. Section 17: Lawn Replacement
2. Section 112: Trees, Plants & Groundcover

1.2 QUALITY ASSURANCE

A. Sod: Comply with American Sod Producers Association (ASPA) classes of sod materials.

B. Provide and pay for materials testing. Testing agency shall be acceptable to the City. Provide the following date:

1. Test representative materials samples proposed for use.

2. Soil analysis of existing conditions.

    a. Soil pH and recommendations for correction. Ideal pH for Bahia is 5.0 - 6.5.

    b. Nematode infestation check and recommendation for eradication.

    c. Organic matter check and recommendation.

    d. Starter fertilizer check and recommendations.

1.3 SUBMITTALS

A. Submit sod growers certification of grass species. Identify source location.

B. Submit the following material samples:

1. Topsoil.

C. Submit the following material certification:

1. Submit certificates of inspection as required by governmental authorities and manufacturers or vendors certified analysis for soil amendments, herbicides, insecticides and fertilizer materials; submit other data substantiating that materials comply with specified requirements.

D. Submit soil analysis report.

1.04 DELIVERY, STORAGE AND HANDLING

A. Cut, deliver and install sod within a 24-hour period.

1. Do not harvest or transport sod when moisture content may adversely affect Sod survival.

2. Protect sod from sun, wind, and dehydration prior to installation.

3. Do not tear, stretch, or drop sod during handling and installation.

1.05 PROJECT CONDITIONS

A. Work notification: Notify City of Tampa representative at least 7 working days prior to start of sodding operations.

B. Protect existing utilities, paving and other facilities from damage caused by sodding operations.

C. Perform sodding work only after planting and other work affecting ground surface
has been completed.

D. Existing soil to be amended as determined necessary from soil analysis, including:
soil pH, nematode infestation, organic matter check and starter fertilizer check.

E. Restrict traffic from sodded areas until grass is established.

F. Provide grass watering equipment as required.

G. The irrigation system will be installed prior to sodding, if included. Locate, protect and maintain the irrigation system during sodding operations. Repair new and existing irrigation system components damaged during sodding operations at this contractor's expense.

1.06 WARRANTY

A. Provide a uniform stand of grass by watering, mowing and maintaining lawn areas until final acceptance and for a period of 90 days after acceptance. Resod areas, with specified materials, which fail to provide a uniform stand of grass until all affected areas are accepted by the City of Tampa representative.

PART 2: PRODUCTS

2.01 MATERIALS

A. Sod: Provide an "approved" nursery grown sod composed of sod species indicated in the plans or as needed to match existing or adjacent lawn areas. Otherwise, provide Argentine Bahia (Paspalum notatum "Argentine").

1. Provide well-rooted, healthy sod, free of diseases, nematodes and soil borne insects. Provide sod uniform in color, leaf texture, density, and free of weeds, undesirable grasses, stones, roots, thatch, and extraneous material;
viable and capable of growth and development when planted.

2. Furnish sod machine stripped and of supplier's standard width, length, and

Thickness: Uniformly 1” to 1-1/2” thick with clean cut edges. Mow sod before stripping.

B. Fertilizer:

1. Granular, non-burning product composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer.

   a. Type A: Starter fertilizer containing 16% nitrogen, 4% phosphoric acid, and 8% potash by weight or similar approved composition.

   b. Type B: Top dressing fertilizer containing 31% nitrogen, 3% phosphoric acid, and 10% potash by weight or similar approved composition.

   c. Ground Limestone: Containing not less that 85% of total cabonates and Ground to such fineness that 50% will pass through a 100 mesh sieve and 90% will pass through a 20 mesh sieve.

C. Stakes

1. Steel, tee shaped pins, 4” head x 8” leg.

D. Water: Free of substance harmful to sod growth. Hoses or other methods of Transportation furnished by contractor.

E. Topsoil: Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, reasonably free from clay lumps, coarse sand stones, plants, roots and other foreign materials with an acidity level as specified by type of sod.

1. Identify source location of topsoil.
2. Topsoil shall be fertilized.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine finish surfaces, grades, topsoil quality, and depth.
Do not start sodding work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. If area to be sodded has existing grass or vegetative cover, apply a non-selective Herbicide (Round-up) to area. Wait ten (10) days before continuing with prep work.

B. Loosen topsoil of lawn areas to minimum depth of 8". Remove stones over 1" in
any dimension and sticks, roots, rubbish, and extraneous matter.

C. Add 2" topsoil or organic material as required from organic matter check. Till into top 8" of existing soil.

D. Grade lawn areas to smooth, free drainage and even surface with a loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions as required to drain.

E. Apply limestone at rate determined by the soil test, to adjust pH of topsoil as specified in sod type. Distribute evenly by machine and incorporate thoroughly into topsoil.

F. Apply "Type A" fertilizer as specified by manufacturer. Apply fertilizer by mechanical rotary or drop type distributor, thoroughly and evenly incorporated with the soil to a depth of 3" by discing or other approved methods. Fertilize areas inaccessible to power equipment with hand tools and incorporate it into soil.

G. Dampen dry soil prior to sodding.

H. Restore prepared areas to specified condition if eroded, settled or otherwise Distributed after fine grading and prior to sodding.

3.3 INSTALLATION

A. Lay sod to form a solid mass with tightly-fitted joints. Butt ends and sides of sod

Strips. Do not overlay edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with adjacent curbs, sidewalks, drains and seed areas.

B. Do not lay dormant sod or install sod on saturated soil.

C. Install initial row of sod in a straight line, beginning at bottom of slopes, perpendicular to direction of the sloped area. Place subsequent rows parallel to and lightly against previously installed row.

D. Peg sod on slopes greater than 3 to 1 to prevent slippage at a rate of 2 stakes per

yd. of sod.

E. Water sod thoroughly with a fine spray immediately after laying.

F. Roll with light lawn roller to ensure contact with subgrade.

G. Sod indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.

H. Top dress all seams of sodded area with specified topsoil.

3.4 MAINTENANCE

A. Maintain sodded lawns for a period of at least 90 days after completion and acceptance of sodding operations.

B. Maintain sodded lawn areas, including watering, spot weeding, mowing, Application of herbicides, fungicides, insecticides and resodding until a full, uniform stand of grass free of weed, undesirable grass species, disease, and insects is achieved and accepted by the City of Tampa representative.

1. Water sod thoroughly every 2 to 3 days, as required to establish proper rooting.

2. Repair, rework, and resod all areas that have washed out or are eroded. Replace undesirable or dead areas with new sod.

3. Mow lawn areas as soon as top growth reaches a 3" height. Cut back to 2" height. Repeat mowing as required to maintain specified height. Not more than 40% of grass leaf shall be removed at any single mowing.

4. Apply "Type B" fertilizer to lawns approximately 30 days after sodding at a rate specified by the manufacturer. Apply with a mechanical rotary or drop type distributor. Thoroughly water into soil.

5. Apply herbicides as required to control weed growth or undesirable grass species.

6. Apply fungicides and insecticides as required to control disease and insects.

3.5 ACCEPTANCE

A. Inspection to determine acceptance of sodded lawns will be made by the City Inspector, upon contractor's request.

1. Sodded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, even colored viable lawn is established, fee of weeds, undesirable grass species, disease, and insects.

B. Upon acceptance contractor shall maintain area for 90 days. At the end of this period contractor shall request a final maintenance inspection for acceptance.

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the Work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from sodding operations.

SECTION 16216

DIESEL ENGINE DRIVEN GENERATOR WITH WEATHERPROOF ENCLOSURE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all materials, equipment and incidentals required to delivery, and field test the weatherproof diesel engine driven generator unit, automatic transfer switch, and appurtenances as shown on the Drawings and specified herein.

B. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, and delivery and field testing, of required generator and appurtenances for the complete unit as herein specified, whether specifically mentioned in these Specifications or not.

C. For the unit, there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not. This installation shall incorporate the highest standards for the type of service shown on the Drawings. The Generator Supplier is responsible for field testing of the entire installation and instruction of the regular operating personnel in the care, operation and maintenance of all equipment.

1.02 DESCRIPTION OF SYSTEM

A. The engine-generator sets shall be mounted as shown on the Drawings and shall be arranged for automatic starting and stopping, and load transfer upon failure of the normal source of power. The engine-generator set shall consist of an engine, generator, controls, starting system, cooling system, exhaust system, fuel system, steel support framing, spring isolation and other materials to ensure a properly operating system. The unit controls shall provide for automatic exercising on a weekly basis.

1.03 QUALIFICATIONS

A. The proposed generator shall be from Caterpillar Corporation, model C7.1 diesel generator, 125kW/156.3kVA. The unit shall operate at 480V, 0.8 power factor. No other generator shall be considered an "or equal" in accordance with the City's standardization program. The "or equal" clause applies to all other equipment, unless specifically excluded by a Single Source Certificate or Letter of Standardization.

B. It is the intent of this specification to secure a generator system that have been prototype tested, factory built, production tested, site tested and of the latest commercial design, together with all accessories necessary for a complete installation as shown on the plans and drawings, and specifications herein. The equipment supplied and installed shall meet the requirements of the NEC, along with all applicable local codes and regulations.

C. The generator sets shall be listed to UL 2200.

D. The enclosure and fuel tank shall be by Phoenix Products.

E. See specification section W-48.2 Automatic Transfer Switch for the automatic transfer switch requirements..

1.04 SUBMITTALS

A. Submittals shall include test certification and specification sheets showing all standard and optional accessories to be supplied; schematic wiring diagrams; dimension drawings showing plan and elevations of the complete generator unit: foundation plan, exhaust silencer, starting battery, battery charger, and sound attenuated, weatherproof enclosure; and interconnection diagrams identifying by terminal number each required for interconnection between the generator set and the transfer switch included elsewhere in these specifications.

1. Submit to the Engineer

<u>Engine Data</u>:

a. Manufacturer

b. Model

c. Number of cylinders

d. RPM

e. Bore x stroke

f. BMEP at full rated load

g. Make and model and descriptive literature of electric governor

h. Fuel consumption rate curves at various loads

i. Engine continuous pump drive duty rating (without fan) HP

j. Gross engine horsepower to produce generator standby rating (including fan and all parasitic loads) HP

Generator Data:

a. Manufacturer

b. Model

c. Rated KVA

d. Rated SKVA

e. Rated KW

f. Voltage

g. Temperature rise above 40° C ambient

   i. Stator by thermometer

   ii. Field by resistance

   iii. Class of insulation

Generator efficiency, including excitation losses, at 80% power factor

a. Full load

   i. ¾ load

   ii. ½ load

Generator Unit Control Data:

a. Actual electrical diagrams including schematic diagrams, and

interconnection wiring diagrams for all equipment to be provided. Standard preprinted sheets are not acceptable.

b. Legends for all devices on all diagrams.

c. Sequence of operation explanations for all portions of all schematic wiring diagrams.

Engine/Generator Unit and Sound Attenuated, Weatherproof Enclosure:

a. Dimensional data shall be given for each Engine/Generator set and for the weatherproof enclosure.

i. Weight of skid mounted unit

ii. Overall length

iii. Overall width

iv. Overall height

v. Exhaust pipe size

vi. CFM of air required for combustion and ventilation

vii. Heat rejected to jacket water and lubricating oil - BTU/hr.

viii. Heat rejected to room by engine and generator - BTU/hr.

ix. Weatherproof enclosure details and certification of manufacturing method per specifications.

x. Data on all miscellaneous items supplied.

xi. The generator enclosure and subbase diesel tank submittal shall include wind load calculations and anchorage calculations. All calculations shall be in accordance with the Florida Building Code (FBC).

2. Submit to the Engineer operating and maintenance data.

3. Submit to the Engineer the equipment MANUFACTURER'S Certificate of Proper Installation, Testing, and Instruction.

4. Submit to the Engineer the written warranty as required below.

PART 2 - PRODUCTS

2.01 RATINGS

A. The standby rating of the generator sets shall not exceed the MANUFACTURER's published prime rating by more than 10%. The gross engine horsepower required to produce the standby ratings shall not exceed the MANUFACTURER's published continuous duty rating by more than 150 percent. Continuous duty rating shall be as defined in BS649 or DIN6270 but in no case shall it exceed the MANUFACTURER's published continuous duty rating for the engines as used in continuous rated pump drive applications. The gross engine horsepower required for the generator set standby ratings described above shall include all parasitic demands such as generator inefficiencies, fuel pumps, water pumps, radiator fan (for fan cooled models) and all accessories necessary to the unit's proper operation while operating at rated load and at a rotative speed not to exceed 1800 rpm.

B. The diesel engine driven generator set shall be capable of producing the specified standby KW rating for continuous electrical service during interruption of the normal utility source and shall be certified to this effect by the MANUFACTURER for the actual unit supplied.

2.02 ENGINES

A. The engine shall be full compression ignition, four cycle, single acting, solid injection engine, either vertical or "V" type. Speed shall not exceed 1800 revolutions per minute at normal full load operation. Multi block engines are not allowed. The engine governor shall be electronic type with a +/- 0.5 percent accuracy.

B. The engine shall be capable of satisfactory performance on No. 2 fuel oil (ASTM Designation D396). Diesel engines requiring a premium fuel will not be considered.

C. The engine shall be capable of operating at light loads for extended periods of time and shall provide a means to reduce carbonization. Periodic cleaning of exhaust ports shall not be required.

D. The engine shall be equipped with fuel filters, lube oil filters, intake air filters,

lube oil cooler, fuel transfer pump, fuel priming pump, service meter, engine driven water pump, and unit mounted instruments. Unit mounted instruments shall include a fuel pressure gauge, water temperature gauge, and lubrication oil pressure gauge. The engine shall be provided with low oil pressure, high water temperature, low coolant level and overspeed safety shutdowns of the manual reset type. Additional instruments and safety shutdowns shall be provided as noted herein.

E. Injection pumps and injection valves shall be a type not requiring adjustment in service and shall be of a design allowing quick replacement by ordinary mechanics without special diesel experience. The engine shall have an individual mechanical injection pump and injection valve for each cylinder, any one of which may be removed and replaced from parts stock. Fuel injection pumps shall be positive action, constant-stroke pumps, activated by a cam driven by gears from the engine crankshaft. Fuel lines between injection pumps and valves shall be of heavy seamless tubing.

F. The fuel system shall be equipped with fuel filters having replaceable elements. Filter elements shall be easily removable from their housing for replacing without breaking any fuel line connections, or disturbing the fuel pump, or any other part of the engine. All fuel filters shall be conveniently located in one accessible housing, ahead of the injection pumps so that the fuel will have been thoroughly filtered before it reaches the pump. No screens or filters requiring cleaning or replacement shall be used in the injection pump or injection valve assemblies. The engine shall be equipped with a built-in gear-type, engine-driven fuel transfer pump, capable of supplying fuel through the filters to the injection pump at constant pressure.

G. In addition to the standard fuel filters provided by the engine MANUFACTURER, there shall also be installed a primary fuel filter and a water separator in the fuel inlet line to the engine.

H. The engine shall be provided with removable wet-type cylinder liners of close grained alloy iron, heat treated for proper hardness as required for maximum liner life. The cylinder block shall be a one piece stress relieved gray iron casting.

I. The engine shall have a gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, valve rocker mechanism and governor. Effective lubricating

oil filters shall be provided and so located and connected that all oil being circulated is continuously filtered and cleaned. Filters shall be accessible, easily removed and cleaned and shall be equipped with a spring-loaded by-pass valve as an insurance against stopping of lubricating oil circulation in the event the filters become clogged. The engines shall have a suitable water cooled lubricating oil cooler.

J. The engine shall be provided with one or more engine mounted dry type air cleaners of sufficient capacity to protect effectively the working parts of the engine from dust and grit.

K. During the initial start of the engine, a system shall be provided to pre-lube at low idle speed. When the internal oil pressure reaches a predetermined safe value, the engine will then increase to generator set operation speed.

L. Mounting: The unit shall be mounted on a structural steel sub-base and shall be provided with vibration isolators.

M. The engine shall be EPA Tier 2 certified.

2.03 COOLING SYSTEMS

A. The engine shall be furnished with a unit mounted radiator-type cooling system having sufficient capacity for cooling the engine when the diesel generator set is delivering full rated load in an ambient temperature not to exceed 110 degrees F. The engines shall be provided with a thermostatic valve placed in the jacket water outlet between the engine and the cooling source. This valve shall maintain the proper jacket water temperature under all load conditions. Total air restriction from the radiator shall not exceed 0.5 inches of water at both inlet and outlet. A flexible connecting section shall be provided between the radiator and discharge louver frame.

B. Closed circuit jacket water system shall be treated with a rust inhibiter as recommended by the engine MANUFACTURER.

C. The expansion tank of the radiator shall be fitted with a low water level switch and wired into the safety shutdown system of the unit.

2.04 GENERATOR, EXCITER AND ACCESSORIES

A. Rating: The generator's KW ratings shall be as indicated in these specifications, 0.8 p.f., 1800 RPM, 3 phase, 4-wire, 60 Hertz, 480 volts, 12 leads, with a maximum temperature rise of 130 degrees C (both armature and field) by resistance at full rated load in ambient air of 40 degrees C. The generator shall conform to NEMA Standard MG-1.

B. Performance: The instantaneous voltage dip shall not exceed 15 percent of rated voltage when any load is applied. Recovery of stable operation shall occur within 5 seconds. Steady state modulation shall not exceed + ½ percent.

C. Construction:

1. The generator and exciter shall be dripproof, with split sleeve, or ball race bearings. A shaft-mounted brushless exciter shall be a part of the assembly. The stator cores shall be built up of high-grade silicon steel laminations precision punched, and individually insulated. Armature lamination followers and frame ribs shall be welded integral with the frames for support of the stator core. A directional blower shall be mounted on the unit to draw cooling air from the exciter and over the rotor poles and through louvered openings on the opposite end.

2. The exciter shall be a shaft driven PMG pilot exciter feeding the main's exciter, fast response type, with a rotating 3-phase full-wave bridge. The exciters shall have a low time constant and large capacity to minimize voltage transients under severe load changes.

3. The alternator shall be salient-pole, brushless, 12-lead reconnectable, self- ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the

   NEMA standard (MG1-33.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotors and stators shall be limited to 130° C. The excitation systems shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/- 0.25% at any constant load from 0% to 100% of rating. The regulators must be isolated to prevent

tracking when connected to SCR loads, and provide individual adjustments for voltage range, stability and volts-per-hertz operations; and be protected from the environment by conformal coating.

4. Generator rotor poles shall be built up of individually insulated silicon steel punchings. Poles shall be wound and bonded with high strength epoxy resin. Cage connections to the amortisseur rings shall be brazed for strong construction and permanent electrical characteristics. Each pole shall be securely bolted to the rotor shaft with bolts sized for the centrifugal forces on the rotor. Generator windings shall be braced for full line to ground fault currents, with solidly grounded neutral system.

D. Accessories and Attachments

1. Low Voltage Terminal Boxes: The generators shall have separate AC and DC low voltage terminal boxes with suitably numbered terminal strip for required connections.

2. Engine Water Heater: Thermostatically controlled and sized to maintain the manufacturer's recommended engine coolant temperature to meet start-up requirements of NFPA-110, Level 1. Power supply shall be 120 volts single phase.

3. Alternator Heater: Sized to prevent the accumulation of moisture or dampness in the alternator windings. Power supply shall be 120 volts single phase.

E. Generator Associated Controls:

1. Voltage Regulator:

a. The generator MANUFACTURER shall furnish a hermetically sealed, silicon-controlled rectifier type voltage regulator employing a zener reference with a +1 percent regulation for the generator. The regulators shall include 3- phase voltage sensing, automatic short circuit protection and shall include automatic underfrequency protection to allow the generator to operate at no load at less than synchronous speed for

engine start-up and shutdown procedures. Switches and/or fuses shall not be used to provide this protection. An over-voltage sensing module with manual reset shall be furnished with the regulator. A volts per Hz., sensing module shall be provided as part of the regulation system.

b. A voltage adjustment rheostat for 5 percent voltage adjustment on the unit shall be provided.

c. High voltage step-down potential transformers shall be provided for the voltage regulator power input and sensing circuits if required.

2. Sustained Short Circuit: A permanent magnetic exciter shall be provided on the unit for sustaining a current of 300 percent during a short circuit, permitting the generator breaker to trip on overload. To prevent possible overheating of the armature windings, appropriate relaying shall be supplied to limit the fault to ten seconds.

2.05 SOUND ATTENUATED, WEATHER-PROTECTIVE ENCLOSURES

A. Enclosure shall be manufactured by Phoenix Products of Jacksonville, Florida.

B. The intent of this Specification is to provide the generator system with sound attenuated, weatherproof type generator set enclosures complete in every detail and requiring no additional in-field modifications or assembly, except where specifically allows by these Specifications. The enclosure is to be accurately dimensioned so as to be in compliance with the National Electrical Code (NEC), and the National Fire Protection Association (NFPA) for clearance of all specified items included therein, and all applicable fire codes for a structure and application of this type.

C. The enclosure shall conform to the following construction and design criteria shown on the Structural Drawings. The enclosure shall be designed for the wind loads listed below. Enclosure manufacturer to submit to the Engineer structural drawings and a certification signed and sealed by a Professional Engineer registered in the State of Florida stating that the enclosure is rated to withstand these wind loads.

Wind Loads:

Ultimate Wind Velocity, V_{ULT}	151 MPH
Nominal Wind Velocity, V_{ASD}	117 MPH
Exposure Category	C
Risk Category	III

D. Enclosure shall also include Florida Department of Community Affairs Modular Building Insignia

E. Enclosure shall consist of a roof, two (2) sidewalls, two (2) end walls, and be manufactured of formed aluminum components. The enclosure is to be provided with a means for securely attaching the entire structure to the base/fuel tank as specified within.

F. Roof, sidewalls and end walls shall be of formed 0.125 marine grade aluminum. The roof is to be bolted to both side and end walls to form a complete weather and wind resistance assembly.

G. Wall framing shall be incorporated in the panels by forming an open back box structure. Skin material shall be minimum thickness .080" 3003 grade aluminum. Enclosure shall have a baked on powder-coat finish for maximum corrosion resistance. Exterior skin panels shall be integral to the wall structure and not separate pieces riveted onto framing members. Wall panels shall be no wider than 36" each and shall be removable without the use of special tools. Wall and roof panels shall be designed so that field replacement can be accomplished without disassembly of the entire structure if damage should occur.

H. Standard enclosure exterior color is white.

I. Roof assembly shall be cambered to aid in rainwater runoff. Roofs with thicknesses of less than 0.125" nominally shall not be considered. Roof applications assemblies are to be mechanically fastened to the vertical wall sections. Glued or crimped roofs shall not be allowed nor considered as an acceptable alternative.

J. Air handling shall be as follows: Air will enter the enclosure through a Hood, Plenum or Sound Attenuated Louvers/Baffles, as determined by the specific application and shall allow for the airflow demand for proper cooling to generator set package. The cooling air Inlet system shall prevent water intrusion into the enclosure with the generator set operating at full rated load while allowing for a maximum air restriction of less than 0.30" H2O. Radiator Discharge shall be through a gravity operated extruded aluminum backdraft type damper and into a vertical discharge plenum or hood. Discharge plenum/hood shall discharge air upward and be provided with a means to positively drain any and all water entering the discharge device. Air discharge devices shall in no event restrict airflow by more than 0.25" H2O. To ensure adequate airflow for cooling and combustion the static restriction over the entire system shall not exceed 0.50" H2O. Both Intake and Discharge hoods and plenums shall be provided with removable bird/rodent screening to prevent the entrance of debris, birds, rodents and other vermin.

K. All interior sidewalls shall contain non-asbestos thermal acoustic insulation with fire retardant properties. The insulation shall be completely covered by mill finish 0.050" perforated aluminum lining secured to the enclosure interior.

L. Four-point lifting provisions shall be provided and have sufficient capacity suitable for rigging the entire Enclosure assembly.

M. A minimum of two (2) single access doors shall be provided. Doors shall be manufactured of the same material as enclosure. Doors shall be fully gasketed to form a weather tight perimeter seal. Door hinges shall be full length stainless steel piano type and shall be attached with stainless steel hardware. Door handles shall be of a corrosion resistant material and shall provide for a lockable, secure entry point into the enclosure. Doors shall be insulated with no less insulation than is provided in the enclosure walls for sound attenuation.

N. Enclosure manufacturer shall provide all necessary hardware to internally mount the exhaust silencer(s) specified herein. Silencer mounting hardware shall maintain the weatherproof integrity of the enclosure system. If the silencer is mounted internally it should discharge upward into the radiator discharge plenum or hood where possible, otherwise the enclosure manufacturer shall provide an aluminum rain collar and rain dress shield. Rain Collar and Dress Shield

shall be manufactured of aluminum or stainless steel and designed as a circular fabricated part that does not require hole indexing by the installing contractor during site installation

O. As a minimum the enclosure shall provide an average 42db(A) sound reduction as measured at one meter, five feet above grade level under free field conditions to allow for a maximum of 75db(A) at 5 meters from the enclosure.

P. Electrical Package:

1. (4) LED Lights in Vapor Proof Fixtures. Lights shall be controlled by Switches Located at each of the doors.

2. Engine Jacket Water Heater

3. Alternator Space Heater

4. Engine Starting Battery Charger

5. Emergency Stop Pushbutton: Provide a NEMA 4X SS, Red, Mushroom-head emergency pushbutton that will immediately stop the generator upon activation. Provide a placard above the pushbutton to read “Generator Emergency Shut Down”. Refer to drawings for pushbutton and placard location and details.

6. .

Q. Provide an aluminum platform and stair assembly to access all doors on the generator enclosure as shown in the drawings. Platform and stairs shall comply to the latest edition of the Florida Building Code. Refer to structural drawings for loading requirements.

2.06 EXHAUST SYSTEMS

A. Exhaust Silencers - A critical type, side inlet, end outlet, Miratech or equivalent silencer and a flexible stainless steel exhaust fitting properly sized shall be furnished and installed at the time of manufacture of the Generator system The silencers shall be mounted so that its weight is not supported by the engine nor

will exhaust system growth due to thermal expansion be imposed on the engine. Exhaust pipe size shall be sufficient to ensure that exhaust back pressure does not exceed the maximum limitations specified by the engine MANUFACTURER. So called "spiral" or truck mufflers are disallowed and will not be considered as equal to the industrial quality silencers specified above.

B. The silencers shall be fitted with a tail pipe extension and rain cap to prevent the entrance of rainwater.

C. Rain Skirt - At the point where the exhaust pipe flexible tubing penetrates the roof of the enclosure, a suitable "rain skirt" and collar shall be provided by the MANUFACTURER. It shall be designed to prevent the entrance of rain and allow for expansion and vibration of the exhaust piping without chafing or stress to the exhaust system. This detail must appear on the drawings submitted for approval.

2.07 AUTOMATIC STARTING SYSTEM

A. Starting Motor - A DC electric starting system with positive engagement shall be furnished. The motor voltage shall be 12 volts.

B. Automatic Control - Fully automatic engine start-stop controls in the generator control panels shall be provided. Controls shall provide shutdown for low oil pressure, high water temperature, overspeed, overcrank, and loss of engine coolant. Alarms for approaching high water temperature and impending low oil pressure shall also be included. Controls shall include a 30-second single cranking cycle limit with lockout or a cyclic crank system with lockout and overcrank protection.

C. Batteries - A lead-acid storage battery set of the heavy-duty diesel starting type shall be provided. Battery voltage shall be 12 volts, and the battery set shall be rated no less than 90 ampere hours. Necessary cables and clamps shall be provided.

D. Battery Trays - battery trays shall be provided for the batteries and shall conform to NEC 480-7(b). It shall be constructed of fiberglass and so treated as to be resistant to deterioration by battery electrolyte. Further, construction shall be such that any spillage or boil-over of battery electrolyte shall be

contained within the tray to prevent a direct path to ground.

E. Battery Chargers - A current-limiting, automatic 12-volt DC charger shall be furnished to automatically recharge batteries. Charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, DC ammeter, DC voltmeter, and fused AC input. AC input voltage shall be 120 volts, single phase. Amperage output shall be no less than ten (10) amperes. Chargers shall be wall mounting type in NEMA 1 enclosure, and U.L. listed as an industrial control panel. The chargers shall be as manufactured by SENS per NFPA 110 and U.L. 508. The chargers shall be mounted and wired within the enclosure for the generator set by enclosure manufacturer.

2.08 MAIN LINE CIRCUIT BREAKERS

A. Type - Main line, 600 volt, 100% rated, molded case circuit breaker mounted upon and sized to the output of the generator shall be installed as a load circuit interrupting and protection device. It shall operate both manually for normal switching functions and automatically during overload and short circuit conditions.

B. Main Line Circuit Breaker shall have an adjustable trip rating as shown on the Drawings.

C. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall meet standards established by Underwriters Laboratories, National Electric Manufacturers Association, and National Electrical Code.

D. Generator exciter field circuit breakers do not meet the above electrical standards and are unacceptable for line protection.

E. Circuit breaker shall have battery voltage operated shunt trip wired to safety shutdowns to open the breaker in the event of engine failure. Provide circuit breaker status (Open/Closed) for remote monitoring by SCADA.

F. The rating of the circuit breakers shall allow the starting of full generator SKVA.

H. The circuit breaker enclosure, together with all specified circuit breakers, shall be designed for the specific generator set specified and be equipped with rear copper stabs, or load cable lugs and be finish painted to match the generator set.

2.09 GENERATOR CONTROL PANELS

A. Type - A generator-mounted, NEMA 1 type, vibration isolated, 14-gauge steel control panel shall be provided for the generator set. Control panel shall be Caterpillar model EMCP4.4.

B. Regulation of NFPA 110 Level 2 shall apply for instrumentation, alarm and shutdown. The instrumentation panel shall include, but not necessarily be limited to:

1. Gages for engine : digital or analog gages with ± 2% full scale accuracy :

    a. Oil Pressure
    b. Engine Coolant Temperature
    c. Voltmeter for DC Battery

2. Gages for generator : digital or analog gages with ± 2% full scale accuracy:

    a. AC Ammeter : Dual range
    b. AC Voltmeter : Dual range
    c. Frequency Meter : Range of 45-65 Hz.

3. 0-3000 RPM Tachometer - digital or analog gage with ± 2% full scale accuracy.

4. A seven position phase selector switch with – OFF position to show meter display of current and voltage of each generator phase. This selector switch may be manual or push-button.

5. A power source with circuit protection – 12 or 24 VDC.

6. An AC interlock to prevent starter re-engagement with engine running.

7. DC circuit protection.

8. Eight (8) individual fault indicator lights for :

   a. Overcrank Shutdown – Red
   b. Overspeed shutdown – Red
   c. High Coolant Temperature – Red
   d. Low Engine Oil Pressure – Red
   e. High Engine Coolant Temperatire Prealarm – Yellow
   f. Low Engine Oil Pressure Prealarm – Yellow
   g. Low Fuel – Yellow
   h. Run – Green

C. Switches and Controls

1. Rheostat for adjusting output voltage of the generator to ± 5% of nominal voltage.

2. Over voltage protection shutdown switch.

3. Emergency stop switch mounted on control panel.

4. Engine start switch – with Run, Off, Reset, Automatic positions.

5. Five minute engine cool down timer.

6. Cyclic cranking switch.

D. Dry contacts for remote generator running indication, remote generator fail indication and cranking battery low voltage wired to terminal strips. At a minimum provide dry contacts for generator running, generator fault, cranking battery low voltage, and main circuit breaker status. Refer to drawings for required conduit/conductors.

E. All electrical penetrations in any enclosure shall be properly sealed from the weather.

F. Digital or solid state meters or metering devices shall be acceptable as a substitute for the electromechanical devices specified.

G. Engraved, screw-on type nameplates will identify each function indicated without abbreviation of function description. So-called international symbols will not be acceptable substitutes for this mandatory requirement.

H. Timing Functions - All control panel timing functions shall be accomplished by metal encased, solid-state, plug-in timing relays with 2PDT output contacts rated for ten (10) amperes. All solid-state time delay relays shall be reverse polarity protected and shall not function or be damaged by the application of improper polarity. Open printed circuit board type time delay circuits will not be accepted.

I. Control Relays - All control relays shall be the 3PDT plug-in type with .187QC blade terminals rated for (10) amperes. Each relay shall be equipped with a manual push to operate check button, L.E.D. or neon visual indicator, and see-thru dust cover for contact inspection and protection. Exposed contact and octal base plug-in relays are not acceptable.

J. Relay Sockets - All relay sockets shall be of the molded thermoplastic type, suitable for snap mounting on standard D.I.N. rail. Relay sockets will have wire clamp type terminals for secure wire connections, and one (1) piece bus bar connectors between the actual relay blade and wire clamp terminal. Relay sockets shall be rated for fifteen (15) amperes at 300V. Printed circuit board type relay sockets and relay sockets with push- on quick connect terminals are not acceptable.

2.10 GENERATOR FUEL SYSTEM

A. Due to limited physical dimensions available at the site the units must have the exact physical dimensions as shown on the Drawings.

B. Fuel tank shall be UL 142 rated.

C. The generator tank shall be sized to provide 72-hours of continuous operation at 100% load and assuming a 90% tank capacity.

1. Interstitial space with FDEP Approved Leak Detection Switch (FPI LS1001 EQ#817).

2. 3/16” Mild Steel Secondary Tank.

3. Rupture Basin with FDEP Approved Leak Detection Switch (Madison M-700 EQ#682).

4. Mechanical Fuel Level Gauge (Visible at Fill Point).

5. Supply and Return Connections.

6. 2” Fill with Lockable Cap with FDEP spill containment.

7. Normal and Emergency Vent Fittings Installed Per UL 2085.

8. Diesel Tank Level transmitter with 4-20 mA output.

9. Low Level Fuel Alarm Switch (FPI LS1001 EQ#817). Set at 40% remaining capacity wired to Control Panel Terminal Strip.

10. High Level Fuel Alarm Switch (FPI LS1001 EQ#817). Set at 90% tank capacity wired to Control Panel Terminal Strip. Provide local red alarm light and local audible alarm to indicate high level during fueling

11. Cable Stub Up Opening Under Circuit Breaker.

12. Tank coated with Two Part Epoxy Primer and painted Gloss Black.

13. Tank sealed and shipped under vacuum per Florida Administrative Code Chapter 62-762 and NFPA30.

14. Tank shall carry a two (2) hour fire rating.

15. Mounting provisions shall allow for a minimum 2” airspace between concrete slab and secondary tank to facilitate inspection and maintenance of tank bottom. Designs that do not incorporate spacing between the tank bottom and the concrete pad will not be accepted.

16. 2 Lifting Points per Side (4 Total) for Lifting Generator Set, Enclosure and Tank (Empty).

17. Tank shall be provided with steps welded to the side of diesel tank to accommodate access to the interior of the enclosure.

18. Tank shall be manufactured by Phoenix Products of Jacksonville, Florida.

PART 3 - EXECUTION

3.01 SERVICE FACILITES

A. Manufacturer shall show satisfactory evidence that a local distributor maintains a fully equipped service organization, within a 50-mile radius of the project site, capable of furnishing to this system adequate inspection and maintenance service, including standard replacement parts.

3.02 GENERATOR SET FIELD QUALITY CONTROL

A. A factory authorized service representative of the product supplied, shall inspect all field assembled and installed components and make any necessary corrections to insure proper equipment operation. Any cost associated with this procedure shall be born by the generator supplier.

3.03 GENERATOR SET TRAINING AND DEMONSTRATION

A. A factory representative of the product shall provide the City's maintenance personnel with a thorough period of instruction and hands-on session regarding the operation, trouble shooting and maintenance of all components of the product. Typical training period : one hour.

B. Training shall be video taped and given to the City for future training.

3.04 GENERATOR TESTING

A. To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.

B. Design Prototype Tests: Components of the system such as the engine/generator set and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and preproduction models, which will not be sold, shall have been used for the following tests. Prototype test programs shall include the requirements of NFPA 110 and the following:

1. Maximum power (KW).
2. Maximum motor starting (KVA) instantaneous voltage dip.
3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-2240 and 16.40.
4. Governor speed regulation under steady-state and transient conditions.
5. Voltage regulation and generator transient response.
6. Fuel consumption at 1/4, ½, 3/4, and full load.
7. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
8. Three-phase short circuit tests.
9. Alternator cooling air flow.
10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
11. Endurance testing.

C. Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

1. Single-step load pickup.

2. Transient and steady-state governing.

3. Safety shutdown device testing.

4. Voltage regulation.

5. Rated power.

6. Maximum power.

7. Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.

D. Prior to final acceptance of the generator set, all equipment furnished under this Section shall be field tested per NFPA 110 to show it is free of any defects and the generator set can operate satisfactorily under full load test using resistance type load banks (brine tanks not acceptable). Test shall be for four (4) continuous hours. Any defects which become evident at this time shall be corrected before acceptance.

E. An all-in-place static alignment check of all rotating components shall be made prior to first start-up, after unit is secured in place and all final connections are made.

F. Site Tests: An installation check, start-up and load test shall be performed by the manufacturer's local representative. The Engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

1. Fuel, lubricating oil, an antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.

2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery charger, generator strip heaters, annunciator, etc.

3. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting

and stopping, vibration during running, normal and emergency line-to-line voltage, and phase rotation.

4. Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination.

5. External load bank tests shall be performed with the following criteria:

   i) One (1) hour at 25% load
   ii) One (1) hour at 50% load
   iii) One (1) hour at 75% load
   iv) One (1) hour at 100% load

   Engine coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the load bank tests and a written report shall be provided to the Engineer for record purposes. If, for any reason, any of the one hour load bank tests are interrupted, the associated test shall be repeated.

G. A final alignment check and/or adjustment shall be made successful completion of the load bank tests.

3.05 GENERATOR SET SPARE PARTS

A. The spare parts shall include, but not necessarily be limited to the following:

1. Six (6) Fuses of each type and size used.
2. One (1) Oil, air and fuel filter.
3. One (1) set of belts.
4. One (1) of each special tool or device, if any, required to maintain the

   generator set and included equipment.

3.06 SERVICE CONTRACT

A. The supplier of the generator power system shall include a five (5) year full-service contract for maintenance of the completer engine/generator set. Scheduled oil sampling shall be included in order to forecast and minimize engine failure. The supplier of the equipment shall provide a quarterly (every three months) oil sample analysis.

3.07 WARRANTY

A. Equipment furnished under this Section shall be guaranteed against defective parts and workmanship under terms of the MANUFACTURER'S and dealer's warranty. But, in no event, shall it be for a period of less than five (5) years and 2,500 operating hours from date of acceptance of the system by the city of Tampa and shall include labor, parts and travel time for necessary repairs at the job site. Submittal data received without written warranties as specified will be rejected in their entirety.

City of Tampa – DMI Sub-(Contractors/Consultants/Suppliers) Payments

(DMI 30 FORM)

☐ Partial ☐ Final

Contract No.: _____ WO (if any): _____ Contract Name: _____

Contractor Name: _____ Address: _____

Federal ID: _____ Phone: _____ Fax: _____ Email: _____

GC Pay Period: _____ Payment Request/Invoice Number: _____ City Department: _____

Total Amount Requested for pay period: $_____ Total Contract Amount (including change orders): $_____

-Type of Ownership - S = SLBE, O = Other

Type, Federal ID	Company Name Address Phone & Fax	Total Subcontract Or PO Amount	Amount Paid To Date	Amount To Be Paid For This Period	Amount Pending Previously Reported	Sub Pay Period Ending Date

(Modifying This Form or Failure to Complete and Sign May Result in Non-Compliance)

Certification: I hereby certify that the above information is a true and accurate account of payments to subcontractors/consultants on this contract.

Signed: _____ Name/Title: _____ Date: _____

DMI 30 form (rev. 01/2026) **Note: Detailed Instructions for completing this form are on the next page**

Forms must be signed and dated, or they will be considered incomplete. Failure to sign this document or return it unsigned can be cause for determining that a company is in non-compliance with Ordinance 2008-89.

Instructions for completing DMI Sub-(Contractor's/Consultants/ Suppliers)Payment Form(DMI 30)

This form must be submitted with all invoicing or payment requests where there has been subcontracting rendered for the pay period. If applicable, after payment has been made to the subcontractor, "Waiver and Release of Lien upon Progress Payment", "Affidavit of Contractor in Connection with Final Payment", or an affidavit of payment must be submitted with the amount paid for the pay period.

(Modifying or omitting information from this form may result in non-compliance.)

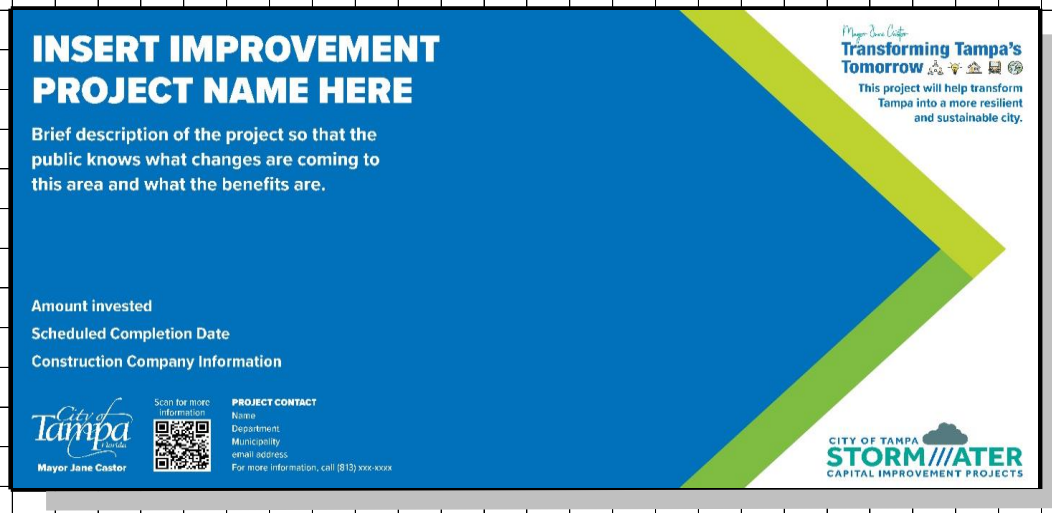
- **Contract No.** This is the number assigned by the City of Tampa for the proposal.
- **W.O. If** the report covers a work order number (W.O. for the contract, please indicate it in that space.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business.
- **Address.** The physical address of your business.
- **Federal ID.** A number assigned to a business for tax reporting purposes.
- **Phone.** Telephone number to contact the business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **Pay Period.** Provide start and finish dates for the pay period. (e.g. 05/01/13 – 05/31/13)
- **Payment Request/Invoice Number.** Provide a sequence number for payment requests. (ex. Payment one, write 1 in the space, payment three, write 3 in the space provided.)
- **City Department**. The City of Tampa department to which the contract pertains.
- **Total Amount Requested for the pay period.** Provide all the dollars you are expecting to receive for the pay period.
- **Total Contract Amount (including change orders).** Provide the expected total contract amount.
- **Signed/Name/Title/Date**. This is your certification that the information provided on the form is accurate.
- **See attached documents.** Check if you have provided any additional documentation relating to the payment data. Located at the bottom middle of the form.
- **Partial Payment.** Check if the payment period is a partial payment, not a final payment.
- **Final Payment.** The check for this period is the final payment period.

The following instructions are for the information of all subcontractors used for the pay period.

- **(Type) of Ownership.** Indicate SLBE or Other.
- **Federal ID.** A number assigned to a business for tax reporting purposes.
- **Company Name, Address, Phone & Fax**. Provide company information for payment verification.
- **Total Subcontract Amount.** Provide the total amount of subcontract for the subcontractor, including change orders.
- **Amount Paid to Date.** Indicate all dollars paid to date for the subcontractor.
- **Amount Pending, Previously Reported.** Indicate any amount previously reported for which payments are pending.
- **Amount To Be Paid for this Period.** Provide the dollar amount requested for the pay period.
- **Sub Pay Period Ending Date.** Provide the date for which the subcontractor invoiced for the work performed.

If any additional information is required or you have any questions, you may call the Office of Equal Business Opportunity at (813) 274-5522.

Sign Information



The QR code should be 5.25” wide by 5.25”

Sign should be 48” high by 96” wide

Transforming Tampa's Tomorrow

This project will help transform Tampa into a more resilient and sustainable city.

Font

Proxima Nova font family
If that font is not available, the Calibri font family may be used

Colors

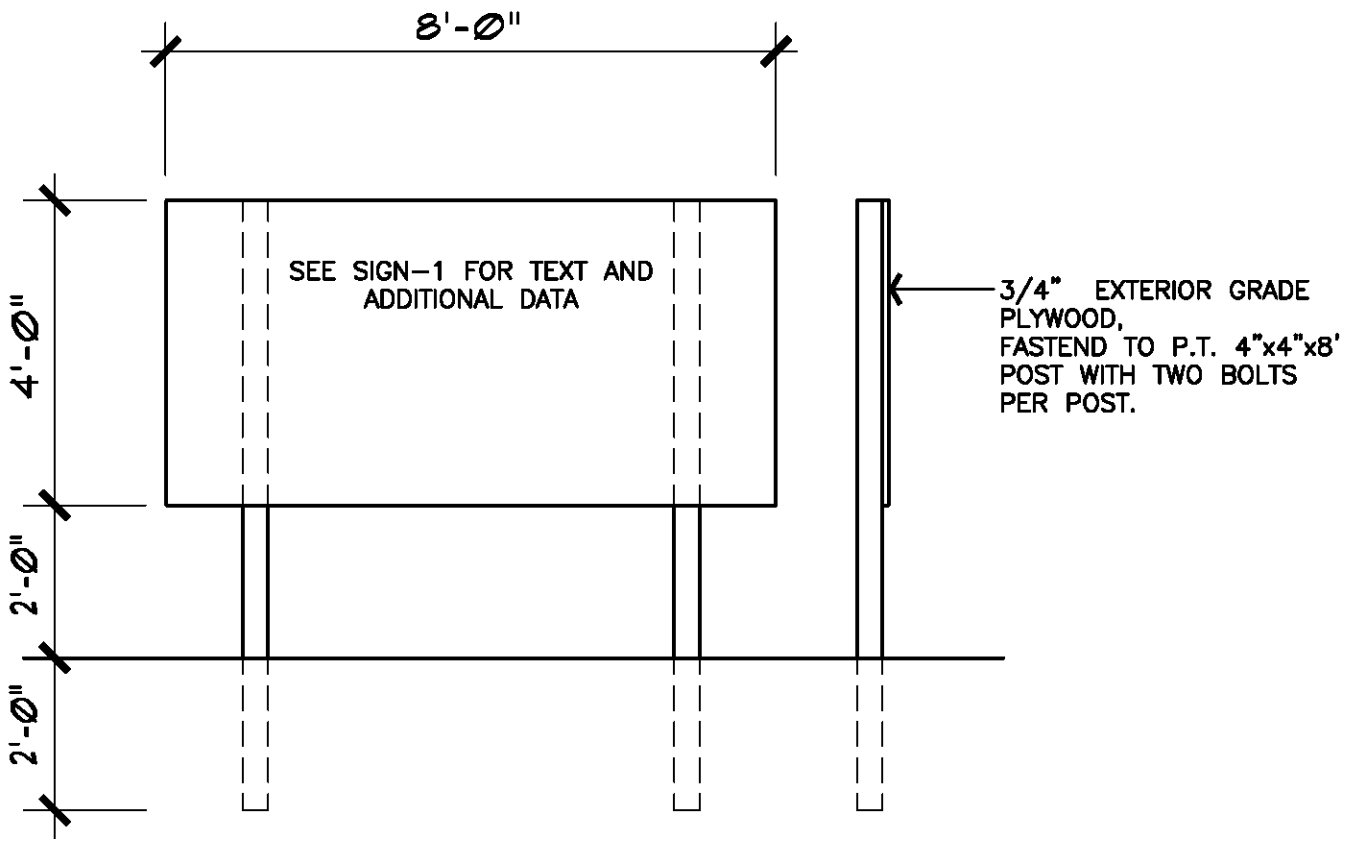
PANTONE	285 C	
PANTONE	376 C	
PANTONE	382 C	

12"

12" scale:

SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR

K:\CA\edr\dpw project sign 4-28-04.dwg, 08/22/2005 12:32:38 PM, pw1m



CITY OF TAMPA–PROJECT SIGN
REVISED 4/28/04