

**The Enclosed Document Is Provided For Your Convenience.**

**Please Email ALL Questions:**  
**[MailTo:ContractAdministration@TampaGov.net](mailto:ContractAdministration@TampaGov.net)**

**Please Let Us Know If You Plan To Bid**

City of Tampa  
Contract Administration Department  
306 E. Jackson St. #280A4N  
Tampa, FL 33602  
(813)274-8456

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 18-C-00016**

# **University Pumping Station Automatic Bar Screen**

City of Tampa  
CONTRACT ADMINISTRATION DEPARTMENT  
TAMPA MUNICIPAL OFFICE BUILDING  
306 E. JACKSON STREET - 4<sup>TH</sup> FLOOR NORTH  
TAMPA, FLORIDA 33602

AUGUST 2018

CITY OF TAMPA  
CONTRACT ADMINISTRATION DEPARTMENT  
306 E. Jackson Street 280A4N  
Tampa, FL 33602

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**BID NOTICE MEMO**

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**Bids will be received no later than 1:30 p.m.** on the indicated Date(s) for the following Project(s):

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**CONTRACT NO.:** 18-C-00016; University Pumping Station Automatic Bar Screen

**BID DATE:** September 25, 2018 **ESTIMATE:** \$1,700,000 **SCOPE:** The project comprises furnishing all labor, materials and equipment to remove one (1) manually raked bar screen and replace with one (1) automatic bar screen, washer/compactor, slide gate with electric actuator and associated electrical and instrumentation work; miscellaneous concrete and restoration work including crack and concrete repairs, removal of existing PVC liner and application of a protective coating; installation of handrails, bypass pumping, pavement restoration and traffic control., with all associated work required for a complete project in accordance with the Contract Documents. **PRE-BID CONFERENCE:** Tuesday, September 11, 2018, 10:30 a.m., 920 E. 131<sup>st</sup> Ave., Tampa, FL 33612. Attendance is not mandatory, but recommended.

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Bids will be opened in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida 33602. Pre-Bid Conference is held at the same location unless otherwise indicated. Plans and Specifications and Addenda for this work may be examined at, and downloaded from, [www.demandstar.com](http://www.demandstar.com). Backup files are available at <http://www.tampagov.net/contract-administration/programs/construction-project-bidding>. Email Questions to: [contractadministration@tampagov.net](mailto:contractadministration@tampagov.net) .

**BIDDING REQUIREMENTS**

Notice to Bidders .....N-1  
Instructions to Bidders..... 1-1a thru 1-4  
Insurance Requirements .....INS-1 thru INS-2  
U-WMBE Availability Contact List ..... ACL-1  
Availability Contact List Instructions ..... ACLI-1

**BID FORMS**

Proposal ..... P-1 thru P-3  
Good Faith Efforts Compliance Plan ..... GFECF  
SLBE Solicited ..... DMI-Solicited  
SLBE Utilized.....DMI-Utilized  
Bid Bond..... BB-1

**CONTRACT FORMS**

Agreement .....A-1 thru A-15  
Public Construction Bond .....PB-1 thru PB-3

**GENERAL PROVISIONS**

General Provisions.....G-1 thru G-10  
Specific Provisions .....SP-1 thru SP-19  
Subcontractors Payment Form .....DMI-Payments  
Project Sign.....Sign-1 thru Sign-2

**CONTRACT ITEMS**

Contract Item 100-Automatic Bar Screen Installation and Pump Station Modifications ..... C-1  
Contract Item 200-Coating within Pump Station Concrete Channel and Wetwell ..... C-1  
Contract Item 300-Concrete Repair and Restoration-Crack Treatment ..... C-1  
Contract Item 400-Concrete Repair and Restoration-Hairline Crack Repair..... C-2  
Contract Item 500- Concrete Repair and Restoration-Concrete Repair ..... C-2  
Contract Item 600-Contingency ..... C-3

**SPECIFICATIONS**

Section 07081 Flashing and Sheet Metal ..... 07081-1  
Section 07100 Waterproofing and Moisture-proofing..... 07100-1  
Section 09970 PVC Liner Removal and Concrete Repair..... 09970-1  
Section 11000 General Requirements for Equipment ..... 11000-1  
Section 11002 Rigid Equipment Mounts ..... 11002-1  
Section 11005 Machine Alignment..... 11005-1  
Section 11283 Slide Gates..... 11283-1

Section 11320 MultiRake Coarse Screen and Washer/Compactor System .....	11320-1
Section 13231 Influent Channel and Wetwell Cleaning.....	13231-1
Section 13400 General Instrumentation and Control.....	13400-1
Section 13451 Programmable Logic Control (PLC) System .....	13451-1
Section 16050 Electrical-General Provisions.....	16050-1
Section 16075 Electrical Identification .....	16075-1
Section 16445 Motor Control Center Modifications .....	16445-1

**WORKMANSHIP AND MATERIALS**

Section 1 – Excavation – Earth and Rock.....	W1-1
Section 2 – Backfilling.....	W2-1
Section 4 – Concrete, Mortar & Grout Materials.....	W4-1
Section 5 – Concrete .....	W5-1
Section 6 – Reinforcing Steel.....	W6-1
Section 9 – Structural and Miscellaneous Steel .....	W9-1
Section 12 – Precast Concrete Manholes .....	W12-1
Section 16 – Restoration of Street Pavement.....	W16-1
Section 20 – Maintaining Existing Sanitary Sewer in Operation .....	W20-1
Section 27 – Demolition .....	W27-1
Section 30 – Miscellaneous Pipe and Fittings .....	W30-1
Section 31 – Hangers and Supports .....	W31-1
Section 32 – Valves .....	W32-1
Section 36 – Painting. ....	W36-1
Section 47 – Controls.....	W47-1
Section 52 – Manhole and Structure Rehabilitation. ....	W52-1
Section 62 – Control and Wiring for Packaged Units.....	W62-1
Section 63 – Concrete Restoration.....	W63-1
Section 68 – Miscellaneous Pipe and Fittings .....	W68-1
Section 76 – Conduit, Wire, and Grounding.....	W76-1
Section 84 – Valve and Gate Operators .....	W84-1
Section 88 – Caulking and Sealing .....	W88-1
Section 113-Disposal of Debris .....	W113-1

NOTICE TO BIDDERS  
CITY OF TAMPA, FLORIDA  
Contract 18-C-00016; University Pumping Station Automatic Bar Screen

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., September 25, 2018, in the 4<sup>th</sup> 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, furnishing all labor, materials and equipment to remove one (1) manually raked bar screen and replace with one (1) automatic bar screen, washer/compactor, slide gate with electric actuator and associated electrical and instrumentation work; miscellaneous concrete and restoration work including crack and concrete repairs, removal of existing PVC liner and application of a protective coating; installation of handrails, bypass pumping, pavement restoration and traffic control., 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 DemandStar.com. Backup files 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  
Contract Officer, Jody Gray  
City legal department

Any Requests For Information must be submitted by email to [ContractAdministration@tampagov.net](mailto: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 Statutes.

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 University Pumping Station Automatic Bar Screen 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](mailto: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 DemandStar.Com and on the Department's web page, with notice given to all prospective bidders at the respective fax numbers or e-mail addresses furnished, for such purposes. 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

INSTRUCTIONS TO BIDDERS  
SECTION 1 - SPECIAL INSTRUCTIONS

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, as enacted by Ordinance No. 2008-89.

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 300 consecutive calendar days. The period for performance shall start from the date indicated in the Notice To Proceed.

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.

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.

INSTRUCTIONS TO BIDDERS  
SECTION 1 – SPECIAL INSTRUCTIONS

I-1.10 EQUAL BUSINESS OPPORTUNITY PROGRAM (EBO) REQUIREMENTS / PROJECT SUBCONTRACTING GOAL(S)

**BIDDERS MUST SUBMIT COMPLETED AND SIGNED CITY OF TAMPA FORMS MBD-10 AND MBD-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 SECTION THAT APPLIES TO THIS BID.**



**SUBCONTRACTING GOAL – (WMBE and 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 with City-certified underutilized WMBEs (Women and Minority Business Enterprises) and/or 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):** 19.93% **U-WMBE (Underutilized Woman and Minority Business Enterprise) (EBO Program)**

*per MBD Form-70 the U-WMBE subcontract Classification for Construction is African American (BBE)*

\_\_\_\_% **SLBE (Small Local Business Enterprise) (EBO Program)** *only City-certified SLBEs*

\_\_\_\_% **U-WMBE/SLBE Combined (EBO Program)**

*per MBD Form-70 the U-WMBE subcontract Classification for Construction is African American (BBE) together with City-certified SLBEs*

\_\_\_\_% **WMBE/SLBE ASPIRATIONAL (EBO Program)** An all-inclusive SLBE/WMBE 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.diversitysoftware.com> as the Availability Contact List may not be inclusive of all firms that could count toward Goal attainment. However, ONLY SUBCONTRACTING with those specific WMBEs designated as "underutilized" by Classification in the appropriate industry category (and, if made applicable by being specifically included in the above Goal, SLBEs) will count toward meeting the Goal. 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 (GFCEP) (MBD Form-50) for specific requirements.

GOOD FAITH EFFORT COMPLIANCE PLAN (GFCEP) REQUIRED (MBD FORM-50). When a Goal has been established, the Bidder **must submit** with its bid a Good Faith Effort Compliance Plan (GFCEP) using the attached MBD Form-50 together with supporting documentation as specified therein. **Submittals that do not contain MBD Form-50 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 GFCEP (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:** When U-WMBEs are included in a Goal, only those City-certified subcontractors whose WMBE Classification is designated "underutilized" will count toward Goal attainment. Refer to **MBD Form-70** to identify underutilized WMBEs by subcontract Classification for the applicable project industry category. A prime bidder who is a City-certified WMBE and/or SLBE is not exempt from the **GFCEP MBD Form-50** 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 **10.65%** 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 MBD-10 and MBD-20 completed and signed with its bid or the bid will be deemed non-responsive.

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

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

**For additional information about the WMBE and SLBE programs contact the Minority and Small Business Development Office at 813-274-5522. (3-18)**

INSTRUCTIONS TO BIDDERS  
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.11 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-1.12 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-1.13 AGREEMENT

**SECTION 2 – POWERS OF THE CITY’S REPRESENTATIVES**, new Article 2.05:

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 5 – SUBCONTRACTS AND ASSIGNMENTS**, Article 5.01, Page A-7, last paragraph:

Change “...twenty-five (25) percent...” to “...fifty-one (51) percent...”

**SECTION 8 – CONTRACTOR’S EMPLOYEES**, Article 8.03, Page A-9, delete Article 8.03 in its entirety and

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.

INSTRUCTIONS TO BIDDERS  
SECTION 1 - SPECIAL INSTRUCTIONS

**SECTION 10 – PAYMENTS**, Article 10.05, Page A-10, 1<sup>st</sup> Paragraph, 1<sup>st</sup> Sentence:

Change "...fair value of the work done, and may apply for..." to "...fair value of the work done, and shall apply for..."

**SECTION 11 – MISCELLANEOUS PROVISIONS**, Article 11.02, Page A-12, 1<sup>st</sup> Paragraph, 2<sup>nd</sup> Sentence:

Delete the 2<sup>nd</sup> Sentence in its entirety and replace it with the following new 2<sup>nd</sup> 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, Page A-12:

Delete Article 11.03 in its entirety and replace with the following new article:

ARTICLE 11.03 INTENTIONALLY OMITTED.

**SECTION 11 – MISCELLANEOUS PROVISIONS**, Article 11.07, Page A-12:

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 Contractor 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

INSTRUCTIONS TO BIDDERS  
SECTION 1 - SPECIAL INSTRUCTIONS

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, Page A-13:  
Change Article 11.12 to 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-1.14 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.

INSTRUCTIONS TO BIDDERS  
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.15 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-1.16 PAYMENT DISPUTE RESOLUTION

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

I-1.17 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 Petroleum Energy Sector 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-1.18 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.

# 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 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 as 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 Contract Administration Department, 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 Public Construction Bond within twenty (20) 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 ninety (90) 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 Public Construction Bond and insurance.

Should it be necessary for the City to retain the bid security 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 ninety (90) 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 Public Construction Bond within twenty (20) days after written notice by 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 Public Construction Bond within twenty (20) 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 Public Construction 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 misunderstanding 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 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 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: B+ Class VI 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 give 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 item 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 ninety (90) 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 beginning 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.

Bidders must, if requested, submit with their initial bid a signed statement as to whether they have previously performed work subject to the President's Executive Order Nos. 11246 and 11375.

Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the Contract.

Successful Bidders must, if requested, submit a list of all subcontractors who will perform work on the project and written,

signed statement from authorized agents of the labor pools with which they will or may deal for employees on the work together with supporting information to the effect that said labor pools practices and policies are in conformity with Executive Order No. 11246 and that said labor pools will affirmatively cooperate in or offer no hindrance to the recruitment, employment and equal treatment of employees seeking employment and performing work under the Contract, or a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish them prior to the award of the Contract.

#### I-2.15 LABOR STANDARDS

The Bidder's attention is directed to the 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 NOTICE TO PROSPECTIVE FEDERALLY-ASSISTED CONSTRUCTION CONTRACTORS

A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted to said Secretary prior to the award of a federally-assisted construction and Contract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The form of certification may be bound herein following the form of Bid Bond.

Contractors receiving federally-assisted construction Contract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractor for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause:

#### NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

"A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause."

"Contractors receiving subcontract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide from the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause."

The United States requires a pre-award conference if a proposed construction contract exceeds one million dollars to determine if the the prospective contractor is in compliance with the Equal Employment Opportunity requirements of Executive Order 11246 of September 24, 1965. In such instances, a meeting may be scheduled at which the prospective contractor must specify what affirmative action he has taken or proposed to take to assure equal employment opportunity which must be approved by the United States before award of the contract will be authorized.

Bidders must be prepared to submit an Equal Employment Opportunity (EEO) plan at a pre-award conference. The plan must include bidding opportunities offered by the Bidder to minority subcontractors.

On October 13, 1971, President Nixon issued Executive Order 11246 emphasizing the government's commitment to the promotion of minority business enterprise. Accordingly, the United States is firmly

committed to the utilization of available resources to support this important program. U.S. agencies are most interested in realizing minority participation on the subject. Achieving equal employment opportunity compliance is required through Executive Order 11246. WE cannot emphasize too strongly that minority subcontractors be extended subcontractors bidding opportunities as but one step in your affirmative action policy.

Due to the importance of this contract, U.S. Agencies may conduct an EEO Conference prior to the award of the Contract. It is suggested that the responsive Bidder confirm the minority subcontractors he contacted for bids or quotations in his EEO plan submitted at the conference.

#### I-2.18 EEO AFFIRMATIVE ACTION REQUIREMENTS

By the submission of a Proposal, each Bidder acknowledges that he understands and will agree to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under any contract awarded pursuant to solicitation. Each Bidder agrees that if awarded a contract, he will similarly bind contractually each subcontractor. In policies, each Bidder further understands and agrees that if awarded a contract, he must engage in Affirmative Action directed to promoting and ensuring equal employment opportunity in the work force used under the contract (and he must require contractually the same effort of all subcontractors whose subcontracts exceed \$100,000). The Bidder understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the project. \*\*\*\*\* END of SECTION \*\*\*\*\*

## 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/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 for injuries to persons (including death) or damages to property 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. Firm's maintenance of insurance coverage as required herein is a material element of the Agreement and the failure to maintain or renew coverage or provide evidence of same (defined to include without limitation Firm's affirmative duty to provide from time to time upon City's request certificates of insurance, complete and certified copies of Firm's insurance policies, forms, and endorsements, information on the amount of claims payments or reserves chargeable to the aggregate amount of coverage(s) whether during the term of the Agreement or after as may be requested by the City in response to an issue or potential claim arising out of or related to the Agreement to which Firm's insurance obligations hereunder may apply or possibly help mitigate) may be treated as a material breach of the Agreement. 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 (i) terminate the Agreement or (ii) purchase such coverages as City deems necessary to protect itself (charging Firm for same) and at City's option suspending Firm's performance until such coverage is in place. If Firm does not reimburse City for such costs within 10 days after demand, in addition to any other rights, City shall also have the right to offset such costs from amounts due Firm under any agreement with the City. 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 City reserves the right from time to time to modify or waive any or all of these insurance requirements (or to reject policies) based on the specific nature of goods/services to be provided, nature of the risk, prior experience, insurer, coverage, financial condition, failure to operate legally, or other special circumstances. If Firm maintains broader coverage and/or higher limits than the minimums shown herein, the City requires and shall be entitled to such broader coverage and/or higher limits maintained by Firm. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City. No representation is made that the minimum insurance requirements are sufficient to cover Firm's interests, liabilities, or obligations. Required insurance shall not limit Firm's liability.

Firm acknowledges and agrees Firm and not the City is the party in the best position to determine applicability (e.g. "IF APPLICABLE"), confirm, and/or verify its insurance coverage. Acceptance by the City, or by any of its employees, representatives, agents, etc. of certificates or other documentation of insurance or policies pursuant to the terms of this document and the Agreement evidencing insurance coverages and limits does not constitute approval or agreement that the insurance requirements have been met or that coverages or policies are in compliance. Furthermore, receipt, acceptance, and/or approval of certificates or other documentation of insurance or policies or copies of policies by the City, or by any of its employees, representatives, agents, etc., which indicate less coverage than required does not constitute a waiver of Firm's obligation to fulfill these insurance requirements.

### MINIMUM SCOPE AND LIMIT OF INSURANCE <sup>1</sup>

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 2S 03 or 2S 04 or equivalent). **(ALWAYS APPLICABLE)**

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). **(ALWAYS APPLICABLE)**

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. **(ALWAYS APPLICABLE)**

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. **(ALWAYS APPLICABLE)**

E. Builder's Risk Insurance for property loss exposure associated with construction/renovation/additions to buildings or structures, including materials or fixtures to be incorporated. Must be "All Risk" form with limits of no less than the project's completed value, have no coinsurance penalties, eliminate the "occupancy clause", cover Firm (together with its contractors, subcontractors of every tier, and suppliers), and name City as a Loss Payee. **(IF APPLICABLE)**

F. Installation Floater coverage for property (usually highly valued equipment or materials such as compressors, generators, etc.) during its installation. Coverage must be "All Risk" including installation and transit for no less than 100% of the installed replacement cost value. **(IF APPLICABLE)**

G. Architects & Engineers Liability/ Professional Liability (E&O)/ Contractors Professional Liability (CPL)/ Medical Malpractice Insurance where Agreement involves Florida-regulated professional services (e.g. architect, engineer, design-builder, CM, accountant, appraiser, investment banker medical professional) at any tier, whether employed or independent, vicarious design liability exposure (e.g. construction means & methods, design supervision), value engineering, constructability assessments/reviews, BIM process, and/or performance specifications. Limits of at least \$1M per occurrence and \$2M aggregate; deletion of design/ build liability exclusions, as applicable, and maintained for at least 3 years after completion of work/services and City's acceptance of same. **(IF APPLICABLE)**

H. Railroad Protective Liability CRPL Insurance for construction within 50ft of operated railroad track(s) or where affects any railroad bridge, trestle, tunnel, track(s) roadbed, or over/under pass. Subject to involved rail road's approval prior to commencement of work. **(IF APPLICABLE)**.

I. Pollution and/or Asbestos Legal Liability Insurance where Agreement involves asbestos and/or environmental hazards/contamination risks (defined broadly, e.g. lead, mold, bacteria, fuel storage, underground work, cleanup (owned or non-owned sites), pollutant generation/transportation, marine/natural resource damage, contamination claim, restitution, business interruption, mold, fungus, lead-based paint, 3rd party claims/removal, etc.), with limits of at least \$1M per occurrence and \$2M aggregate, maintained for at least 3 years after Agreement completion. **(IF APPLICABLE)**

J. Cyber Liability Insurance where Agreement involves portals allowing access to obtain, use, or store data; managed dedicated servers; cloud hosting services; software/hardware; programming; and/or other IT services

<sup>1</sup> "M" indicates million(s), for example \$1M is \$1,000,000

and products are involved. Limits of not less than \$2M per occurrence and \$2M aggregate. Coverage sufficiently broad to respond to duties and obligations undertaken by Firm, and shall include, but not be limited to, claims involving infringement of intellectual property/copyright, trademark, trade dress, invasion of privacy violations, damage to or destruction of electronic information, information theft, release of confidential and/or private information, alteration of electronic information, extortion, virus transmission, and network security. Coverage, as applicable and with sufficient limits to respond, for breach response costs, regulatory fines and penalties, credit monitoring expenses. **(IF APPLICABLE)**

K. Drone/UAV Liability Insurance where Agreements involves unmanned aerial vehicles/drones. Coverage to include products and completed operations, property damage, bodily injury with limits no less than \$1M per occurrence, and \$2M aggregate; may be provided by CGL endorsement subject to City's prior written approval. **(IF APPLICABLE)**

L. Longshore & Harbor Workers' Compensation Act/Jones Act for work being conducted near, above, or on "navigable waters" for not less than the above Employer's Liability Insurance limit. **(IF APPLICABLE)**

M. Garagekeeper/Hangerkeeper/Marina Operator Legal Liability Insurance and/or Hull/P&I Insurance where parking lot, valet, dealership, garage services, towing, etc. and/or operation of a hangar, marina, or air

plane/ship repairer, providing safe berth, air/watercraft storage/docking (on land/ in water), fueling, tours, charters, ferries, dredges, tugs, mooring, towing, boat/aircraft equipment/repair/alteration/maintenance, etc.; cover- age against liability for damage to vehicles air/watercraft, their machinery in Firm's care, custody, or control both private & commercial. Limits at least equal to greater of \$1M, value of max number of vehicles that may be in Firm's custody, or of most costly object in Firm's custody. **(IF APPLICABLE)**

N. Property Insurance and Interruption of Business CIOB) Insurance where premises, building, structure, or improved real property is leased, licensed, or otherwise occupied by Firm. Property Insurance against all risks of loss to any occupant/tenant improvements at full replacement cost with no coinsurance penalty, including fire, water, leak damage, and flood, as applicable, vandalism and malicious mischief endorsements. IOB by which minimum monthly rent will be paid to City for up to 1 year if premises are destroyed, rendered inaccessible or untenable, including disruption of utilities, water, or telecommunications. **(IF APPLICABLE)**

O. Liquor Liability/Host Liquor Liability where Firm directly or indirectly provides alcoholic beverages, limits of at least \$1M per occurrence and \$1M aggregate. **(IF APPLICABLE)**

P. Educators Legal Liability Insurance where day care, after school program, recreational activities, etc. limits per G above. **(IF APPLICABLE)**

### ADDITIONAL REQUIREMENTS

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, employees, and volunteers together with, as applicable, any associated lender of the City 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:

- Contract Administration Department, 306 E Jackson St, Tampa, FL 33602     Purchasing Department, 306 E Jackson Street, Tampa, FL 33602  
 Other: \_\_\_\_\_

CERTIFICATE OF INSURANCE (COI) – 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, employees, and volunteers. Any insurance or self-insurance maintained by the City, its elected officials, departments, officers, employees, and volunteers shall be excess of the Firm's insurance and shall not contribute with it.

SUBCONTRACTORS/INDEPENDENT ASSOCIATES/CONSULTANTS/SUBTENANTS/SUBLICENSEE - **Firm shall require and verify that all such entities maintain insurance meeting all requirements stated herein with the City as an additional insured** by endorsement (ISO FORM CG 20 38, or broader) or otherwise include such entities within Firm's insurance policies. Upon City's request, Firm shall furnish complete and certified copies of copies of such entities' insurance policies, forms, and endorsements.

SUBCONTRACTOR DEFAULT INSURANCE CONTROLLED INSURANCE PROGRAM, WRAP-UP. Use requires express prior written consent of City Risk Manager.

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.

WAIVER/RELEASE AGREEMENT – Where Firm has a defined group of persons who might be exposed to harm (e.g. participants in an athletic event/program, volunteers) any waiver or release agreement used by Firm whereby such persons (and their parent/guardian as applicable) discharge Firm from claims and liabilities, shall include the City, its elected officials, departments, officers, officials, employees, and volunteers to the same extent as Firm.

**UNIVERSITY PUMPING STATION AUTOMATIC BAR SCREEN  
Project #18-C-00016**

**U-WMBE Availability Contact List**

**(The Underutilized WMBE Industry Category for Construction Subcontracts is BBE )**

#'s	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	Cert. Type	Ethnicity
	ECO 2000 INC	352-793-5060	352-793-9074	WATERWORKS@ECO2000.com	1611 W C-48	BUSHNELL	FL	33513	Bypass Pumping	933648996	BBE	African American
	McKenzie Contracting	813-454-4429	813-454-4429	kathy@mckenziecontracting.com	7712 E. Broadway Av	Tampa	FL	33619	Bypass Pumping	63561860	BBE	African American
	All In One Electric Inc	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W WATERS AVE	TAMPA	FL	33604	Electrical and Instrument	43689273	BBE	African American
	Brown & Brown Electric	954-938-8986	954-938-9272	Hermine.Brown@brownandbrown.com	1150 SW 30th Avenue	Pompano Beach	FL	33069	Electrical and Instrument	92283934	BBE	African American
	Fennell Electric, Inc.	407-466-9408	866-514-3716	fennellelectric@yahoo.com	604 Glenfield Ct	Apopka	FL	32712	Electrical and Instrument	10557754	BBE	African American
	J & J Multiservices LLC	813-662-0888	813-654-7184	mjones@jnjmultiservices.com	3433 Lithia Pinecrest	Valrico	FL	33596	Electrical and Instrument	93744152	BBE	African American
	MDH Enterprises, Inc	386-789-2672	866-681-5026	matize@my-es.com	281 East C Street	Orange City	FL	32763	Electrical and Instrument	50849332	BBE	African American
	Denson Construction	863-709-1001	863-709-1071	pete@denson-construction.com	4270 HOLDEN ROAD	LAKELAND	FL	33811	Concrete Work	93571944	BBE	African American
	Excel 4 LLC	407-480-8976		excel4llc@yahoo.com	318 N. John Young Parkway	Kissimmee	FL	34741	Concrete Work	54149326	BBE	African American
	Exclusive Contractor	863-559-1039	000-000-0000	roadcontractor2@yahoo.com	277 S. 10th Ave	Bartow	FL	33830	Concrete Work	92345574	BBE	African American
	Excel 4 LLC	407-480-8976		excel4llc@yahoo.com	318 N. John Young Parkway	Kissimmee	FL	34741	Demolition	54149326	BBE	African American
	Exclusive Contractor	863-559-1039	000-000-0000	roadcontractor2@yahoo.com	277 S. 10th Ave	Bartow	FL	33830	Demolition	92345574	BBE	African American

**African American/Black Business Enterprises (BBE) shall count toward the subcontract goal. Refer to MBD Form 70 - Procurement Guidelines**



Instructions Regarding Use of the WMBE/SLBE Availability Contact List

**Bidders must solicit a subcontracting bid from ALL of the firms listed on the WMBE/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 WMBE/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 WMBE/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.

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\*  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 only if applicable)*

Bidder Contact Name\*\*: \_\_\_\_\_ Email: \_\_\_\_\_ Phone: (\_\_\_\_) \_\_\_\_\_

Bidder's own initial application for employment has criminal history screening practices similar in nature to the practices contained in Chapter 12, Article VI, City of Tampa Code (*Responses, whether "Yes" or "No", are for informational purposes only and will not be used as a basis of award or denial, nor as a basis for any protest*): Yes No

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.
- (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:

\* If a Partnership or Joint Venture, attach Partnership or Joint Venture Agreement.

\*\* Someone the City may contact with questions/correspondence regarding this Solicitation and/or permits.

Item No.	Description	Unit	Approx. Quantity	Unit Price in Words	Unit Price	Total Computed Price
100	Furnishing all labor, materials, and equipment to construct an automatic bar screen system, slide gate, concrete slabs, dumpster canopy, relocate chemical storage tank and feed system, handrailing, electrical and I&C, all necessary demolition, and cleaning of the channel from the 60-inch diameter inlet pipe to and including the pump station wet well. Contactor shall furnish all labor, materials, and equipment to setup and provide temporary by-pass pumping throughout construction including line stops, demolition and road repair, and maintenance of traffic.	LS	1		\$	\$
200	Coating within Pump Station Concrete Channel and Wet Well	SF	1000		\$	\$
300	Concrete Repair and Restoration Crack Treatment	LF	100		\$	\$
400	Concrete Repair and Restoration Hairline Crack Repair	LF	100		\$	\$
500	Concrete Repair and Restoration Concrete Repair				\$	\$
500.1	0-1" DEPTH	SF	1200		\$	\$
500.2	>1-3" DEPTH	SF	100		\$	\$
500.3	>3-5" DEPTH	SF	100		\$	\$
600	Contingency	LS	1	One Hundred Thousand Dollars	100,000.00 \$	100,000.00 \$

Computed Total Price in Words: \_\_\_\_\_  
 \_\_\_\_\_ dollars and \_\_\_\_\_ cents.

Computed Total Price in Figures: \$ \_\_\_\_\_

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:

	<b>Trench Safety Measure (Description)</b>	<b>Unit of Measure (LF, SY)</b>	<b>Unit Quantity</b>	<b>Unit Cost</b>	<b>Extended Cost</b>
A.	_____	_____	_____	_____	_____
B.	_____	_____	_____	_____	_____
C.	_____	_____	_____	_____	_____
<b>Total Cost: \$</b>				_____	

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.**

[SEAL]

Name of Bidder: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_

Signer's Printed Name: \_\_\_\_\_

Signer's Title: \_\_\_\_\_

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

For an entity: 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.

For an individual: The forgoing instrument was sworn (or affirmed) before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by \_\_\_\_\_, who 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: \_\_\_\_\_



# Good Faith Effort Compliance Plan Guidelines

for Women/Minority Business Enterprise/Small Local Business Enterprise Participation  
City of Tampa - Equal Business Opportunity Program  
(MBD Form 50 – detailed instructions on page 2 of 2)

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 Women/Minority Business Enterprises/Small Local Business Enterprises (WMBE/SLBE) on the referenced contract:

The WMBE/SLBE participation **Goal is Met or Exceeded**. See DMI Forms 10 and 20 which accurately report all subcontractors solicited and all subcontractors to-be-utilized.

The WMBE/SLBE participation Goal is **Not Achieved**. The following list is an overview of the baseline GFE action steps already performed. Furthermore, it is understood that these GFE 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 remarks)

- (1) Solicited through reasonable and available means the interest of WMBE/SLBEs that have the capability to perform the work of the contract. The Bidder or Proposer must solicit this interest within sufficient time to allow the WMBE/SLBEs to respond. The Bidder or Proposer must take appropriate steps to follow up initial solicitations with interested WMBE/SLBEs.  See DMI report forms for subcontractors solicited.  See enclosed supplemental data on solicitation efforts.  Qualifying Remarks:
- (2) Provided interested WMBE/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 WMBE/SLBEs that have submitted bids (e.g. adjusted quantities or scale). Documentation of negotiation must include the names, addresses, and telephone numbers of WMBE/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 WMBE/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 RFO/RFP in nature and negotiations are limited to clarifications of scope/specifications and qualifications.  See enclosed documentation.  Qualifying Remarks:
- (4) Not rejecting WMBE/SLBEs as being unqualified without justification based on a thorough investigation of their capabilities. The WMBE/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 WMBE/SLBE subcontractors and suppliers; and, segmented portions of the work or material consistent with the available WMBE/SLBE subcontractors and suppliers, so as to facilitate meeting the goal.  Sub-Contractors were allowed to 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 work of a contract with its own forces/organization. A Bidder/Proposer who desires to self-perform the work 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:
- (7) Segmented portions of the work to be performed by WMBE/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 WMBE/SLBE participation, even when the Bidder/Proposer might otherwise prefer to perform these work items with its own forces.  Sub-Contractors were allowed to 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 WMBE/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 WMBE/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 WMBE/SLBEs.  See enclosed documentation.  The following services were used:

Note: Provide any unsolicited information that will support the Bid/RFP Compliance Evaluation.  Named Documents Are:



**Participation Plan: Guidance for Complying with Good Faith Efforts Outreach**  
**(page 2 of 2)**

1. All firms on the WMBE/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 or utilized. Other opportunities for subcontracting may be explored by consulting the City of Tampa MBD Office and/or researching the on-line Diversity Management Business System Directory for Tampa certified WMBE/SLBE firms.
2. Solicitation of WMBE/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 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 any WMBE/SLBE low quotes rejected, an explanation shall be provided detailing negotiation efforts.
4. If a low bid WMBE/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 WMBE/SLBE directory may be useful in identifying additional subcontracting opportunities and firms not listed in the "WMBE/SLBE Goal Setting Firms List."
6. Contractor shall not preclude WMBE/SLBEs from bidding on any part of work, even if the Contractor may desire to self-perform the work.
7. Contractor shall avoid relying solely on subcontracting out work-scope where WMBE/SLBE availability is not sufficient to attain the pre-determined subcontract goal set for the Bid or when targeted sub-consultant participation is stated within the RFP/RFQ.
8. In its solicitations, the Bidder should offer assistance to WMBE/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 WMBE/SLBEs, if needed.
10. Contractor should use the services offered by such agencies as the City of Tampa Minority and Small Business Development Office, Hillsborough County Entrepreneur Collaborative Center, Hillsborough County Economic Development Department's MBE/SBE Program and the NAACP Empowerment Center to name a few for the recruitment and placement of WMBEs/SLBEs.



**Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive**

**Page 1 of 4 – DMI Solicited/Utilized Schedules  
City of Tampa – Schedule of **All Solicited** Sub-(Contractors/Consultants/Suppliers)  
(FORM MBD-10)**

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 to this form)

**Note: Form MBD-10 must list ALL subcontractors solicited including Non-minority/small businesses**

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

S = SLBE W=WMBE O = Neither	Company Name Address Phone, Fax, Email	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade or Services  NIGP Code (listed above)	Contact Method L=Letter F=Fax E=Email P=Phone	Quote or Response Received Y/N

Failure to Complete, Sign and Submit  
this form with your Bid or Proposal  
Shall render the Bid Non-Responsive  
(Do Not Modify This Form)

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

Signed: \_\_\_\_\_ Name/Title: \_\_\_\_\_ Date: \_\_\_\_\_

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



## Instructions for completing The Sub-(Contractors/Consultants/ Suppliers) Solicited Form (Form MBD-10)

**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 on this form. The instructions that follow correspond to the headings on the form required to be completed. Note: Ability or desire to self-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 bid or 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 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 (MBD Form-30) must be submitted with every pay application and invoice. Note: Certified **SLBE or WMBE firms** bidding as Primes **are not exempt** from outreach and solicitation of subcontractors.
- **No Firms were contacted because.** Provide brief explanation why no firms were contacted or solicited.
- **See attached documents.** Check 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 MBD Form-10 must be in the same format and have all requested data from MBD Form-10 included.

The following instructions are for information of any and all subcontractors solicited.

- **“S” = SLBE, “W” = WMBE.** Enter “S” for firms Certified by the City as Small Local Business Enterprises and/or “W” for firms Certified by the City as either Women/Minority Business Enterprise; **“O” = Non-certified others.**
- **Federal ID. FIN.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification and payment of the contractor/subcontractor.
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials** indicate the trade, service, or materials provided by the subcontractor. NIGP codes aka “National Institute of Governmental Purchasing” are listed at top section of document.
- **Contact Method L=letter, F=fax, E=Email, P=Phone.** Indicate with letter the method(s) of soliciting for bid.
- **Quote 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 - Minority and Small Business Development Office at (813) 274-5522.



**Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive**

**Page 3 of 4 – DMI Solicited/Utilized Schedules**  
**City of Tampa – Schedule of All To-Be-Utilized Sub-(Contractors/Consultants/Suppliers)**  
**(FORM MBD-20)**

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 to this form)

Note: Form MBD-20 must list ALL subcontractors To-Be-Utilized including Non-minority/small businesses

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, "W" for firms Certified as Women/Minority Business Enterprise, "O" for Other Non-Certified

S = SLBE W=WMBE O =Neither	Company Name Address Phone, Fax, Email	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic Am. AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade, Services, or Materials  NIGP Code Listed above	\$ Amount of Quote. Letter of Intent (LOI) if available	Percent of Scope or Contract %

Failure to Complete, Sign and Submit  
 this form with your Bid or Proposal  
 Shall render the Bid Non-Responsive.  
 (Do Not Modify This Form)

Total ALL Subcontract / Supplier Utilization \$ \_\_\_\_\_  
 Total SLBE Utilization \$ \_\_\_\_\_  
 Total WMBE Utilization \$ \_\_\_\_\_  
 Percent SLBE Utilization of Total Bid/Proposal Amt. \_\_\_\_\_% Percent WMBE 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 Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive**  
**Forms must be included with Bid / Proposal**



## Page 4 of 4 DMI – Solicited/**Utilized**

### Instructions for completing **The Sub-(Contractors/Consultants/ Suppliers) to be Utilized Form (Form MBD-20)**

**This form must be submitted with all bids or proposals. All subcontractors (regardless of ownership or size) projected to be utilized must be included on this form.** Note: Ability or desire to self-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 bid or 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 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 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 (MBD Form-30) must be submitted with every pay application and invoice. Note: certified **SLBE or WMBE firms** bidding as Primes **are not exempt** from outreach and solicitation of subcontractors, including completion and submitting Form-10 and Form-20.
- **No Firms listed To-Be-Utilized.** Check box; provide 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 (GFECF) requirements applies (MBD Form-50) and supporting documentation must accompany the bid.
- **See attached documents.** Check 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 MBD-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 information of Any and All subcontractors To Be Utilized.

- **Federal ID. FIN.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **“S” = SLBE, “W” = WMBE.** Enter “S” for firms Certified by the City as Small Local Business Enterprises and/or “W” for firms Certified by the City as Women/Minority Business Enterprise; **“O” = Non-certified others.**
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **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/mbd> “Information Resources”.
- **Amount of Quote, Letters of Intent** (required for both SLBEs and WMBEs).
- **Percent of Work/Contract.** Indicate the percent of the total contract price the subcontract(s) represent. For CCNA only (i.e. Consultant A/E Services) you must indicate subcontracts as percent of total scope/contract.
- **Total Subcontract/Supplier Utilization.** – Provide 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 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).
- **Total WMBE Utilization.** Provide total dollar amount for all projected WMBE 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.
- **Percent WMBE Utilization.** Total amount allocated to WMBEs divided by the total bid/proposal amount.

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

TAMPA BID BOND  
Contract 18-C-00016; University Pumping Station Automatic Bar Screen

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 18-C-00016, University Pumping Station Automatic Bar Screen.

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.

AGREEMENT

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 18-C-00016 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 18-C-00016; University Pumping Station Automatic Bar Screen, shall include, but not be limited to, furnishing all labor, materials and equipment to remove one (1) manually raked bar screen and replace with one (1) automatic bar screen, washer/compactor, slide gate with electric actuator and associated electrical and instrumentation work; miscellaneous concrete and restoration work including crack and concrete repairs, removal of existing PVC liner and application of a protective coating; installation of handrails, bypass pumping, pavement restoration and traffic control., 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.

# 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 Performance 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 Contract.

(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 Contract 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 or 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 or 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 indemnify 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 Contract 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 of 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 EEO AFFIRMATIVE ACTION REQUIREMENTS**

The Contractor understands and agrees to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under this Contract. The Contractor also agrees to similarly

bind contractually each subcontractor. In policies, the Contractor agrees to engage in Affirmative Action directed at promoting and ensuring equal employment opportunity in the work force used under the Contract (and the Contractor agrees to require contractually the same effort of all subcontractors whose subcontractors exceed \$100,000). The Contractor understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the Contract.

**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.

\* \* \* \* \*

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

\_\_\_\_\_  
Bob Buckhorn, Mayor  
(SEAL)

ATTEST:

\_\_\_\_\_  
City Clerk

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

\_\_\_\_\_  
Rachel S. Peterkin, Assistant City Attorney

Contractor

By: \_\_\_\_\_  
(SEAL)

Title:

ATTEST:

\_\_\_\_\_  
Witness

TAMPA AGREEMENT (ACKNOWLEDGMENT OF PRINCIPAL)

STATE OF \_\_\_\_\_ )  
 ) SS:  
COUNTY OF \_\_\_\_\_ )

For a Corporation:

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_ of \_\_\_\_\_, 20\_\_ by \_\_\_\_\_ of \_\_\_\_\_, a \_\_\_\_\_ corporation, on behalf of the corporation. He/she is \_\_\_\_ personally known or has \_\_\_\_ produced \_\_\_\_\_ as identification.

\_\_\_\_\_  
Notary

My Commission Expires:  
\_\_\_\_\_

For an Individual:

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_ of \_\_\_\_\_, 20\_\_ by \_\_\_\_\_ who is \_\_\_\_ personally known to me or has \_\_\_\_ produced \_\_\_\_\_ as identification.

\_\_\_\_\_  
Notary

My Commission Expires:  
\_\_\_\_\_

For a Firm:

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_ of \_\_\_\_\_, 20\_\_ by \_\_\_\_\_ who signed on behalf of the said firm. He/she is \_\_\_\_ personally known or has \_\_\_\_ produced \_\_\_\_\_ as identification.

\_\_\_\_\_  
Notary

My Commission Expires:  
\_\_\_\_\_

**PUBLIC CONSTRUCTION BOND**

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:

**Countersignature:**

By \_\_\_\_\_  
Assistant City Attorney

\_\_\_\_\_  
(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 the 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.

## TEMPORARY STRUCTURES

### 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 constructed in accordance with the requirements of the Contract Documents.

## SECTION 6

### 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.

**SECTION 13  
CLEANING**

**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.

**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.

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## SPECIFIC PROVISIONS

### SP-1 Scope

The work included under these Contract Documents comprises the construction of University Pumping Station Automatic Bar Screen and all miscellaneous and appurtenant work. The University Pumping Station shall consist of the procurement and labor for installation of one automatic bar screen, one screening washer compactor, one automated slide gate and two disposal dumpsters. The work at the University Pumping Station shall consist of the cleaning and rehabilitation of the influent sewer channel and wet well including removal of sludge, grit, and debris. The influent channels and wet well shall be inspected for damage to the existing PVC linear and structure. All corroded concrete and unattached liner must be removed and damaged concrete repaired and coated.

The work consists of furnishing, constructing, installing, testing and maintaining the said sewers and structures complete and in place.

The Contractor shall furnish all labor, materials and equipment for the accomplishment of all work as described in the Specifications, as shown on the Plans and as directed by the Engineer in accordance with the obvious or expressed intent of the Contract.

### SP-2.TP.C Permits

The Contractor shall have in his possession the proper license to perform the work before submittal of his bid and shall obtain any required 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.

County permit fees will be paid by the Contractor.

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, and with Hillsborough County building regulations.

The Contractor is responsible to schedule and coordinate with the Hillsborough County Building Department all required inspections and tests for all phases of work to obtain final approval thereof.

The Contractor is encouraged to contact the County's Building Department prior to commencement of work to ascertain its respective requirements.

### SP-5 Working Drawings

Prior to performing any work requiring working drawings, as specified on the Plans and in the Workmanship and Materials Sections, the Contractor shall submit the working drawings in accordance with the General Provisions section headed "Working Drawings."

### SP-6 Environmental Protection

The Contractor will be held liable for the violation of any and all environmental regulations. Violation citations carry civil penalties and in the event of willful violation, criminal penalties. The fact that the permits are issued to the City does not relieve the Contractor in any way of his environmental obligations and responsibilities.

#### SP-8 Construction Start

Construction will not begin prior to receipt by the City of the required permits. If issuance of the Notice to Proceed is delayed due to permit acquisition, the contract time will be extended to suit, but no extra payment will be made to the Contractor.

#### SP-9 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-10 Connections Between Construction

The Contractor shall provide an approved type masonry bulkhead, spigot plug, bell cap, or standard pipe plug in the sewer, manhole, junction chamber, pipe stub or other location to provide for terminating construction when the work is performed in phases and the connecting phase is not complete.

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 classified unit price Contract Items for pipe lines, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

#### SP-12 Releasing Facilities for Use

It is the intent of these Specifications that all newly constructed sewers and appurtenant facilities be placed in service as rapidly as an integrated portion of the facilities can be constructed, inspected and accepted by the Engineer. Acceptance or use by the City of any portion of the facilities prior to final acceptance shall not relieve the Contractor of any responsibilities, regarding such facilities, included in the Contract.

#### SP-13 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 the Contractor has received the Engineer's written approval of the manufacturers.

#### SP-14 Contractor Emergency Response Time

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 one (1) hour. A contact person and telephone number shall be provided to the Engineer for such purposes.

#### SP-15 Contractor's Field Office

Delete Article G-6.03 Contractor's Field Office from GENERAL PROVISIONS. The Contractor or an authorized agent shall be present 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 the job site.

#### SP-16.PS Salvage

All salvageable material, as determined by the Engineer, shall be removed by the Contractor and shall remain the property of the City.

All such salvaged items shall be removed by the Contractor, delivered, and unloaded at a location within the Department's service area, as directed by the Engineer. The Contractor shall include all necessary labor and equipment to unload the materials at a location designated 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 Unit Prices or the Lump Sum Price, as applicable, and no separate payment will be made therefor.

#### SP-17 Sequence of Operations

The Contractor shall develop with the Engineer a complete schedule of operations which, in the opinion of the Engineer, will permit use of the facility at the earliest possible date.

Taking over of parts of the work for operation before completion of the entire project shall not relieve the Contractor of any responsibility for proper integrated operations of all parts of the work, nor shall it act to relieve him of any responsibilities under Article A-6.04 of the Agreement, for guaranty of all parts of the work, for one year after the date of acceptance of all the work on the project.

#### SP-18 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 therefor.

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.

#### SP-19 Prevention, Control and Abatement of Erosion and Water Pollution

The Contractor shall be responsible for prevention, control and abatement of erosion, siltation and water pollution resulting from construction of the project until final acceptance of the project.

He shall provide, install, construct, and maintain any covering, mulching, sodding, sand bagging, berms, slope drains, sedimentation structures, or other devices necessary to meet City, County, State and Federal regulatory agency codes, rules and laws.

The Contractor shall take sufficient precautions to prevent pollution of streams, canals, lakes, reservoirs and other water impoundments with fuels, oils, bitumen, calcium chloride or other harmful materials. Also, he shall conduct and schedule his operations so as to avoid or otherwise minimize pollution or siltation of such streams, and the like, and to avoid interference with movement of migratory fish. No residue from dust collectors or washers shall be dumped into any live stream.

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. 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-20 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.

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.

No extra payment will be made for obliterating of certain names and offices and replacement thereof with others because of administrative changes during the course of the Contract.

#### SP-22 Construction Operations

In City streets, excavated materials shall, where practicable, be deposited upon streets, sidewalks, driveways, or other paved surfaces within the street right-of-way, except that interruptions to the use of driveways shall be kept to a minimum. The Contractor shall clean up areas from which soil has been removed at the end of each day by sweeping, washing, or other approved methods. When the work is halted by rain, the Contractor shall clean up the working areas before leaving the site.

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 ASHA standards and be structurally stable as approved by the Engineer. No excavations shall be left open over a weekend.

In general, pipes shall be laid in open cut, except when another method, such as jacking, augering or tunneling is shown on the Plans, specified or ordered.

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

#### SP-23 Project Cleanup

Cleanup is extremely important and the Contractor will be responsible for keeping the construction site neat and clean with debris to be removed regularly as the work progresses.

#### SP-24.SH Maintenance of Traffic

The Contractor shall arrange his work so that there will be as little disruption of traffic as possible.

Except as otherwise permitted, two traffic lanes shall be kept open at all times in State and County highways.

The Contractor shall furnish and maintain all necessary signs, barricades, lights and flagmen necessary to control traffic and provide for safety of the public, all in compliance with the Florida Department of Transportation "Manual on Traffic Controls and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations," with subsequent revisions and additions, and to the satisfaction of the Engineer.

On County maintained roads/streets, if a temporary road/street closure is required, certain information should be submitted to the Superintendent of Maintenance, Hillsborough County, a minimum of ten (10) days prior to the anticipated closure. Further, if closure is approved, the Contractor must notify all law enforcement offices, EMS office, fire departments and school bus system of the closure and the life expectancy of the closure.

The cost of maintaining traffic and of any additional earth excavation, selected fill, temporary wearing surface, temporary bridges, barricades, warning lights, flagmen and like work required therefor shall be included under the various classified unit price Contract Items for pipelines, or in the total Lump Sum Price, as applicable, and no additional payment will be made therefor.

#### SP-25 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, streets and highways are under the jurisdiction of the City of Tampa, Department of Public Works or State of Florida, Department of Transportation. Outside the City of Tampa, streets and highways are under the jurisdiction of the County of Hillsborough or the State 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 plant, materials and equipment shall conform to the requirements of the City of Tampa and, where applicable, the County of Hillsborough or State Department of Transportation, and will be subject to the inspection and approval of the duly authorized representatives of the City, County and the State.

#### SP-26 Surface 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. 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 classified unit price Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

Existing corrugated metal and concrete pipe culverts removed during the construction work shall be stored and maintained in sound, useful condition and replaced upon completion of the work. Culverts damaged by the Contractor shall be replaced with new culverts meeting the applicable requirements of the Standard Specifications for Road and Bridge Construction published by the Florida Department of Transportation. No separate payment will be made for replacement of damaged culverts.

#### SP-28 Work Adjacent to Utilities

Existing utilities including house services adjacent to or crossing the line of the work shall be protected as shown on the Plans, specified hereinbefore, and in accordance with the requirements of the General Provisions.

#### SP-29 Utility Protection Considerations

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 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 and other protective measures as may be necessary to satisfactorily accomplish the construction of this project. The cost of such sheeting and shoring and other protective measures shall be included in the unit prices as bid for the storm or sanitary sewer pipe items, and no separate payment shall be made therefor.

#### SP-34 Existing Storm Sewerage Facilities

In the course of the work, it will be necessary to install the pipeline under or closely adjacent to existing culverts and other storm sewerage facilities. The Contractor shall protect all existing storm sewerage facilities which are shown on the Plans or located in the field during the course of the work. When approved by the Engineer, relocation or special maintenance of storm sewerage facilities during construction will be permitted. Disruption of service shall be kept to a minimum.

Facilities which are damaged due to the work method of the Contractor shall be replaced by the Contractor to such limits as directed by the Engineer. Materials used for such replacements shall be similar to those used in the existing facility and shall conform to City Standards for the construction of storm sewers for work done in the City of Tampa. Work done outside the City shall conform to the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction."

The cost of protecting, replacing, relocating and maintaining storm sewerage facilities shall be included in the various classified unit price 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.

The maintenance and guarantee provisions of the Agreement shall also apply to all replacements of damaged or relocated storm sewerage facilities accomplished by the Contractor.

#### SP-44 Standard for Filter Fabric

Unless specified otherwise on the Plans, filter fabric shall be nonwoven fabric per D.O.T. Specification Sections 514 and 985. Payment for furnishing and placing the filter fabric shall be included in the contract price for the item or items to which it is incidental.

#### SP-45 Measurement for Payment

##### Lump Sum Items:

Payment of the lump sum item established in the Contractor's Bid shall be full compensation for all labor, materials, and equipment required to furnish, install, construct, and test the Work covered under the lump sum bid item.

Payment of the lump sum item established in the Contractor's Bid shall also fully compensate the Contractor for any other work which is not specified or shown, but which is necessary to complete the Work.

The lump sum item shall be specifically subdivided by Activity, broken-out in the Schedule of Values.

Payments for the lump sum items specifically broken-out in the Schedule of Values will be based upon physical progress for each activity in accordance with the breakdown of the Lump Sum prices agreed to in the Schedule of Values.

##### Unit Price Items:

Payment for all work shall be in accordance with the unit price bid items in the Bid Form and shall be full compensation for all labor, materials, and equipment required to furnish, install, construct, and test the

Work covered under the unit price bid item. Work for which there is no price schedule item will be considered incidental to the Work and no additional compensation shall be allowed.

Payment will be made only for the actual quantities of work performed in compliance with the Drawings and Specifications. The Contractor will be paid an amount equal to the approved quantity times applicable unit price. Any unused balance of the unit price work shall revert to the City upon completion of the project.

All unit price work shall be considered as part of the Work to be performed within the time limits specified elsewhere for Substantial Completion and Project Completion. No increase in contract time will be allowed for increases in quantities of unit price work performed beyond the quantities shown in the Bid Form, unless it can be demonstrated that the additional Work performed under the unit price item is on the critical path of the Project Schedule.

#### SP-52 Street Pavement Base and Asphalt Surface Replacement

Permanent base material shall be installed and compacted to the required densities (98% modified proctor) in layers not exceeding six (6) inches.

#### SP-53 Street Pavement Surface Replacement

2-inches of Superpave SP-9.5 asphaltic concrete surface replacement shall be constructed by the Contractor across entire pavement width.

#### SP-59 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. MOT implementation
2. By-pass pumping
3. Demolition
4. Pump station cleaning and concrete repair
5. Bar Screen Installation
6. Canopy Installation
7. Restoration

#### SP-60 Contingency

The Contractor shall include a One Hundred Thousand Dollar (\$100,000) contingency sum, to be included as part of the total bid amount for this contract. The contingency is for the purpose of compensating the Contractor for any incidental work that may arise as construction operations proceed and was not addressed as part of the original work portrayed in the Plans and Specifications.

The One Hundred Thousand Dollar (\$100,000) contingency sum is an upset limit. Any amount of the contingency shall be paid only after negotiation.

#### SP-61 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 classified unit price Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment shall be made.

#### SP-63 Existing Sewage Flows

The following flow data was obtained for use by the Department of Sanitary Sewers and is believed to be reasonably accurate, but not guaranteed to be absolutely so, and is presented only as an approximation:

Low Flow	- 5,500 GPM
Average Flow	- 8,500 GPM
Peak Flow	- 20,800 GPM
Rain Peak	- 20,800 GPM

#### SP-64 Bypass Pumping

The Contractor shall submit a detailed plan for bypass pumping to the Engineer for approval prior to proceeding with the work. All required agency approvals and permits, if required, shall be the responsibility of the Contractor. The hydraulic design of the bypass pumping arrangement shall be the sole responsibility of the Contractor. The plan, at a minimum, shall include the following information:

- Site plan showing location and arrangement of pumps and piping, including pipe sizes, fittings, valves, and connections
- Pump operation strategy and projected flow rates
- Pump curves for each size pump
- Detailed submittal information for all bypass pumping system equipment including pumps, generators, variable frequency drives, level sensors, auto-dialer, fuel tanks, etc.
- Temporary electrical service, pump controls, motor starters and VFDs
- Details and Sequencing of all pipe plug installations

The Contractor shall assume responsibility for fines and cleanup cost of upstream overflows due to insufficient or defective bypass pumping operation or untimely responses to high water alarms.

Bypass pumping system shall be capable of providing a minimum peak flow rate at a total of 30 MGD (20,800 GPM) at the total dynamic head of 63 feet.

Pump suction pipes shall be installed in the manholes and structures and inflatable plugs shall be placed in pipes or structures to block the flow during construction. Suction pipes shall be arranged to avoid suction vortices in the structures. External mechanism, such as anti-vortex plates shall be provided if necessary. Temporary covers shall be installed to seal the annular spaces between the suction pipes and the openings in the manholes or structures to prevent the gas from escaping during bypass pumping operations.

The bypass shall be watertight. Individual suction pipes for each bypass pump shall be required, and shall access the manholes or structures through the manhole openings. Manhole frames and tops can be removed in coordination with the City with a minimum of 2 weeks' notice of intent. Removal of structure tops and manhole chimney will need to be authorized in advance by the City. All manhole/structure modifications shall be restored to preconstruction condition or better upon completion of the bypass operation. Manifold suction arrangements will not be considered acceptable. As a minimum, the bypass discharge pipe shall have an air release valve at the highest point.

The bypass pumping system shall as a minimum consist of the pumps, valves, suction and discharge piping, level sensing equipment such as floats, and pump controls to automatically start and stop the pumps. The pumps shall be designed to handle the flow rates shown in the subsection heading "Existing Wastewater Flows". Each pump shall be equipped with a check valve on the discharge to prevent backflow through the pumps.

Bypass system will have a monitoring/alarm system equipped with an auto-dialer that automatically contacts the contractor and subcontractors if high water levels occur. The auto-dialer shall be powered at all times using a battery back-up system or equivalent. The battery system shall be connected to a charger attached to the temporary electric utility service. Contractor shall be available on a 24-hour/7-day/week basis to respond within 1 hour to problems and to make any necessary adjustments and/or repairs needed to maintain continuous operation of the bypass system. The Contractor shall be solely responsible for maintaining the bypass system during the bypass operation. Personnel responding to auto-dialer notifications must be extremely knowledgeable with the bypass pumping system and capable of troubleshooting any problems in a timely manner.

The bypass pumping system shall be placed in operation and tested for a minimum 24 hour period. The bypass pumping system shall be manned (pump watch) during the entire test period. During the test period, all bypass pumping system components shall be tested including all pumps, pump controls and the auto-dialer. Should any problem(s) occur during the test period, the contractor shall rectify the problems and restart the 24 hour bypass pumping system test. Contractor will need to demonstrate a 24 hour trouble free operation of the bypass pumping system before performing any work that will prevent the pumping station to be placed back into service.

Contractor shall provide a perimeter fence around the bypass equipment, with a padlock so that unauthorized persons cannot operate the equipment. Multiple fences or locked panel may be required, dependent on the individual set up of the bypass pumping layout. A new fence will not be necessary if the bypass pumping system can be installed inside a gated/fenced area.

The bypass pumping shall continue in service until all work associated with this contract is substantially complete as determined and approved by the City.

Pumping equipment shall be of a type suitable for pumping raw unscreened wastewater over an indefinite period without clogging or requiring shutdown for routine maintenance. Bypass pumping shall be continuous during the entire length of time each portion of the work is being accomplished.

The bypass pumping system shall include back-up pumps. The back-up pumps shall be completely installed and shall automatically be placed into operation in the event one of the primary pumps fail. Back-up pumps shall be no smaller than the largest primary pumps they are replacing. The number of back-up pumps shall conform to the following chart:

<u>Primary Bypass Pumps</u>	<u>Required Back-up Pumps</u>
1-2	1
3-4	2
5-6	3

Contractor has the option to provide either electric or diesel bypass pumps or a combination of both for the bypass pumping system. If electric pumps are proposed, the contractor will be fully responsible in coordinating the temporary electric service from Tampa Electric Company (TECO) and all costs associated with the temporary service and electrical usage fees while the bypass system is in operation.

The Contractor has the option of providing a) electric primary and back-up pumps, b) electric primary pumps and back-up diesel pumps or c) diesel primary and back-up pumps. If the contractor elects to use all electric pumps as noted in the first option above, standby generator(s) will also be required that automatically start in the event of a power loss. The generator(s) shall be sized to run all the primary bypass pumps at peak flow. For the diesel pumps, there should be sufficient fuel storage at all times for a minimum of 48-hours of continuous operation at peak flow rate.

The bypass pumping system shall be properly secured to avoid damage, vandalism, or unauthorized shutdown. Pumps shall be baffled to comply with all noise abatement ordinances and regulations.

The costs of bypass pumping shall be included in the various Contract Unit Price Items or in the total Lump Sum Price, as applicable, and no separate payment shall be made therefor.

SP-67 Interruption of Service

Because of the nature of the work, it is imperative that the pumping station not be out of service for very long. The Contractor shall plan all this work, especially the work pertinent to the pumping operation, in detail and ensure that all the required items and equipment are on hand and in good working condition.

Prior to initiating any work pertaining to the operation of the pumping station, the Contractor shall submit to the City a detailed plan for shutdown of the station. No shutdown shall be performed until the plan is approved by the Engineer.

Scheduling of all shutdowns (partial or full) shall be coordinated with Tampa Electric Company (TECO) and the City. The Contractor shall make provisions and pay for temporary power used by him in performing this work.

SP-68 Water, Light and Power

Delete Article G-7.01 Water and G-7.02 Light and Power from GENERAL CONDITIONS. The City currently provides water and electrical power facilities to the sites. The Contractor may use the electrical and water sources as presently configured. If necessary to modify, extend, or relocate either the electrical or water facilities to facilitate construction, all costs shall be the responsibility of the Contractor.

### SP-69 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 the following: (1) All fees paid. (2) Inspection by the appropriate electrical department.

### SP-71 Electrical Requirements

#### 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 2014 edition of the National Electrical Code (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 by a nationally recognized testing laboratory (NRTL) as required by the 2017 Florida Building Code, 6<sup>th</sup> edition. All custom control panels shall be assembled by a UL 508A certified panel shop and a UL label shall be applied to the finished product.

#### Electrician Qualifications

The Electrician performing the electrical work shall be licensed / certified in the State of Florida. The Electrician shall be thoroughly experienced with, and regularly engaged in, the demolition, installation, and trouble-shooting of industrial power systems with nominal system voltages of 240 through 13,200 volts. The Electrician shall provide the City with evidence demonstrating at least three (3) years of successful industrial power system installations. The Electrician shall supply the City with references of industrial clients that will attest to the Electrician's work experience.

### SP-72 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 one (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 prior to 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 a minimum four (4) hardcopies and one (1) bookmarked, unsecured electronic portable 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 form that is intended to begin tracking assets and their respective preventative maintenance at an early stage in the project. The Contractor will be required to submit an electronic Asset Tracking Form for each piece of equipment. The information to be included on the form will include general information and specifications on the equipment such as, but not limited to, model, voltage, amperage, horsepower, material, manufacturer, serial number, recommended spare parts and preventative maintenance tasks.

During the preconstruction meeting of the project, the City will furnish the contractor with a blank electronic copy of the ATF in Microsoft Office 2010 and a preliminary list of equipment that will require an ATF. The City may provide the contractor a list of additional equipment requiring an ATF as the project progresses.

The Contractor shall submit all ATF(s) after the project is substantially complete. The City prefers one submission of all ATF(s).

#### SP-73 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-75 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-81 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.

#### SP-84 Piping and Equipment Identification

All piping and equipment shall be identified as follows:

1. All painted piping and equipment shall be color coded. Such coding on pipelines shall include painted or plastic tape banding at 10-foot intervals. The Engineer will select the colors. Underground pipelines with plastic tape wrapping shall be wrapped with colored tape and include additional colored bands as directed. Polyethylene or hot bituminous wrapped underground pipelines shall have plastic tape bands. Polyethylene wrapping for ductile iron sewage or force main piping shall be green. Tape bands shall be placed at 10-foot intervals and all colors shall be selected by the Engineer.

2. All equipment and slide gates shall have an identification nameplate. The nameplates shall be of Type 304 stainless steel, No. 6 finish, not less than No. 16 gauge with indented stamped lettering. Nameplates shall be attached to equipment bases in accessible locations. Nameplates shall be fastened, in a permanent manner arranged not to damage equipment, with not less than four stainless steel fasteners. All nameplates shall be of the same size (approximately 3- by 8-inch) and shall conform to the following standard sample:

Sewage Pump	(Name of item)
SC-P-1	(General type of designation, final list furnished by Engineer)
(12 digit number)	(Furnished by Engineer)

Lettering shall be block style in size and spacing to suit the nameplate. A sample nameplate including fastenings shall be submitted to the Engineer for approval prior to manufacture of any of the nameplates. Stainless steel identification nameplates shall not be painted.

3. Piping shall be identified with a designation and directional flow arrow. The designation will be furnished by the Engineer. The designation will comprise a maximum of 20 letters. The designations and flow arrows shall be painted on after completion of color coding using suitable stencils and colors. Designations and flow arrows shall be arranged to be clearly in view from the normal operating or access space all as directed and approved by the Engineer. Designations and flow arrows shall be located along straight runs at intervals of not more than 50 feet, near valves, branches and junction points, and where pipes pass through walls or ceilings. Underground piping wrapped with polyethylene shall be provided with colored material selected by the Engineer.  
The cost of piping and equipment identification 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-85 Storage of Materials

The Contractor may not use that portion of the right-of-way located between the existing/proposed curb lines or existing/proposed edges of pavement to store pipe, structures, materials, surplus excavated fill, or equipment other than that used for excavating or dewatering. The Contractor may use that portion of the right-of-way behind the existing or proposed curb line or off the edge of pavement for storage 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, all storage areas will be restored to a condition which meets or exceeds the pre-construction condition of the storage area. 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-91 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-112 Removal of Existing Pavement

The Contractor shall remove existing pavement and additional excavated material required for proposed pavement grade, if pavement is disturbed during bypass pumping

The removal of existing pavement shall include the regrading of the shoulder, etc., as indicated on the Plans.

The cost of existing pavement removal and additional dirt removal including all labor, equipment, etc., to complete the job shall be included under the various classified unit price items, or in the total Lump Sum Price, as applicable, and no additional payment shall be made therefor.

#### SP-128 Spare Parts and Special Tools

Spare parts and special tools shall be furnished in accordance with the requirements of the Workmanship and Materials and General Provisions sections. All such items shall be boxed and tagged and clearly marked for identification as to description and their location in the equipment.

The Contractor shall provide an enclosed weatherproof and lighted facility for spare parts and special tools for storage during the construction period. Immediately prior to final inspection of the work, the Contractor shall arrange for delivery of these items to the Engineer. On delivery, the Contractor shall provide the Engineer with an itemized list of each spare part or special tool and the list shall match the identification tag attached to each item. At this time, the Engineer shall inventory the spare parts and special tools. If the inventory is not complete or some items are damaged, the Contractor shall provide the missing items and replace damaged items. No spare parts or special tools will be accepted by the Engineer until notice of final inspection unless the Engineer expressly requests the advance delivery of items. When so requested, the Contractor shall deliver such items to the Engineer. Items delivered in advance shall be deducted from the inventory and the Contractor shall furnish the Engineer's signed receipts, for items delivered in advance, with the final inventory list. Spare parts and special tools stored by the Contractor shall be and remain his responsibility until acceptance by the Engineer. The Contractor shall deliver all items to a location on the Howard F. Curren Advanced Wastewater Treatment Plant site as directed by the Engineer. The cost of all spare parts and special tools and the storage and delivery thereof 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-129.TP 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.

The Contractor shall provide the City of Tampa with one (1) hardcopy and (1) electronic high resolution, searchable, unsecured color PDF copy of "As-Built" plans. Plan sheets shall have all deviations from original design annotated in red to clearly show as-built conditions. Relocation of existing facilities and utilities must be clearly noted.

All as-built plans shall be submitted within seven (7) calendar days of the final inspection. The final payment will not be issued until the as-built plans have been submitted to, and accepted by the City. Upon request by the Contractor, the City will provide AutoCAD drawings when available.

#### SP-130 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 their 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 Contractors work force does not relieve the Contractor of this responsibility.

Suggest, all Contractors employees and sub-contractors be given a copy of SP-130.

The Contractor shall have a designated Safety Officer within his 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 their 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 their 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 that the contract has specified.

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 their daily report and report it to the Risk Management Division (274-5708).

C. Air-Borne Debris: All personnel in close 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 that installed it or if not available, by a City of Tampa AWTP team leader, except in an Emergency and 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. Open Flames: No 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 his 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 thereof.

\* \* \*



**Page 1 of 2 –DMI Payment**  
**City of Tampa – DMI Sub-(Contractors/Consultants/Suppliers) Payments**  
**(FORM MBD-30)**

[ ] 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 - (F=Female M=Male), BF BM = African Am., HF HM = Hispanic Am., AF AM = Asian Am., NF NM → Native Am., CF CM = Caucasian S = SLBE

Type	Company Name Address Phone & Fax	Total Sub Contract Or PO Amount	Amount Paid To Date	Amount To Be Paid For This Period
Trade/Work Activity			Amount Pending Previously Reported	Sub Pay Period Ending Date
[ ]Sub [ ]Supplier				
Federal ID				
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$

**(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 sub – contractors/consultants on this contract.

Signed: \_\_\_\_\_ Name/Title: \_\_\_\_\_ Date: \_\_\_\_\_



## Page 2 of 2 – DMI Payment

### Instructions for completing The DMI Sub-(Contractors/Consultants/ Suppliers) Payment Form (Form MBD-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. The following will detail what data is required for this form. The instructions that follow correspond to the headings on the form required to be completed. **(Modifying or omitted information from this form my result in non-compliance).**

- **Contract No.** This is the number assigned by the City of Tampa for the bid or 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 business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **Pay Period.** Provide start and finish dates for pay period. (e.g. 05/01/13 – 05/31/13)
- **Payment Request/Invoice Number.** Provide sequence number for payment requests. (ex. Payment one, write 1 in space, payment three, write 3 in space provided.)
- **City Department.** The City of Tampa department to which the contract pertains.
- **Total Amount Requested for pay period.** Provide all dollars you are expecting to receive for the pay period.
- **Total Contract Amount (including change orders).** Provide expected total contract amount. This includes any change orders that may increase or decrease the original 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. Located at the top right of the form.
- **Final Payment.** Check if this period is the final payment period. Located at the top right of the form.

The following instructions are for information of any and all subcontractors used for the pay period.

- **(Type) of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business or SLBE.
- **Trade/Work Activity.** Indicate the trade, service, or material provided by the subcontractor.
- **SubContractor/SubConsultant/Supplier.** Please indicate status of firm on this contract.
- **Federal ID.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Total Subcontract Amount.** Provide total amount of subcontract for 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 that payments are pending.
- **Amount To Be Paid for this Period.** Provide dollar amount of dollars requested for the pay period.
- **Sub Pay Period Ending Date.** Provide date for which subcontractor invoiced performed work.

*Forms must be signed and dated or will be considered incomplete. The company authorized representative must sign and certify the information is true and accurate. Failure to sign this document or return the document unsigned can be cause for determining a company is in non-compliance of Ordinance 2008-89.*

If any additional information is required or you have any questions, you may call the Minority Business Development Office at (813) 274-5522.

0 1 2 3 4 5 6 7 8

**Sign Information**

**Building a Better Tampa**

**Downtown Riverwalk**  
*Creates a waterfront pedestrian walkway connecting the south edge of the CapTrust building with MacDill Park.*

**\$1.5 Million investment**  
 Scheduled for completion in October, 2012

**Orion Marine Construction, Inc.**

**Improvement Project**

*City of Tampa*  
 Florida

Mayor Bob Buckhorn

Project Contact:  
 Don Cermeno  
 Contract Administration  
 City of Tampa  
 Don.Cermeno@tampagov.net

For information call:  
 (813) 635-3400



**Building a Better Tampa**

**David L. Tippin Water Treatment Facility Caustic Soda Piping Improvements**

*Project provides for improvements at the David L. Tippin Water Treatment Facility to improve the reliability and safety of the Sodium Hydroxide System of the water distribution system within the facility.*

\$TBD investment  
 Scheduled for completion in TBD 2014

TBD

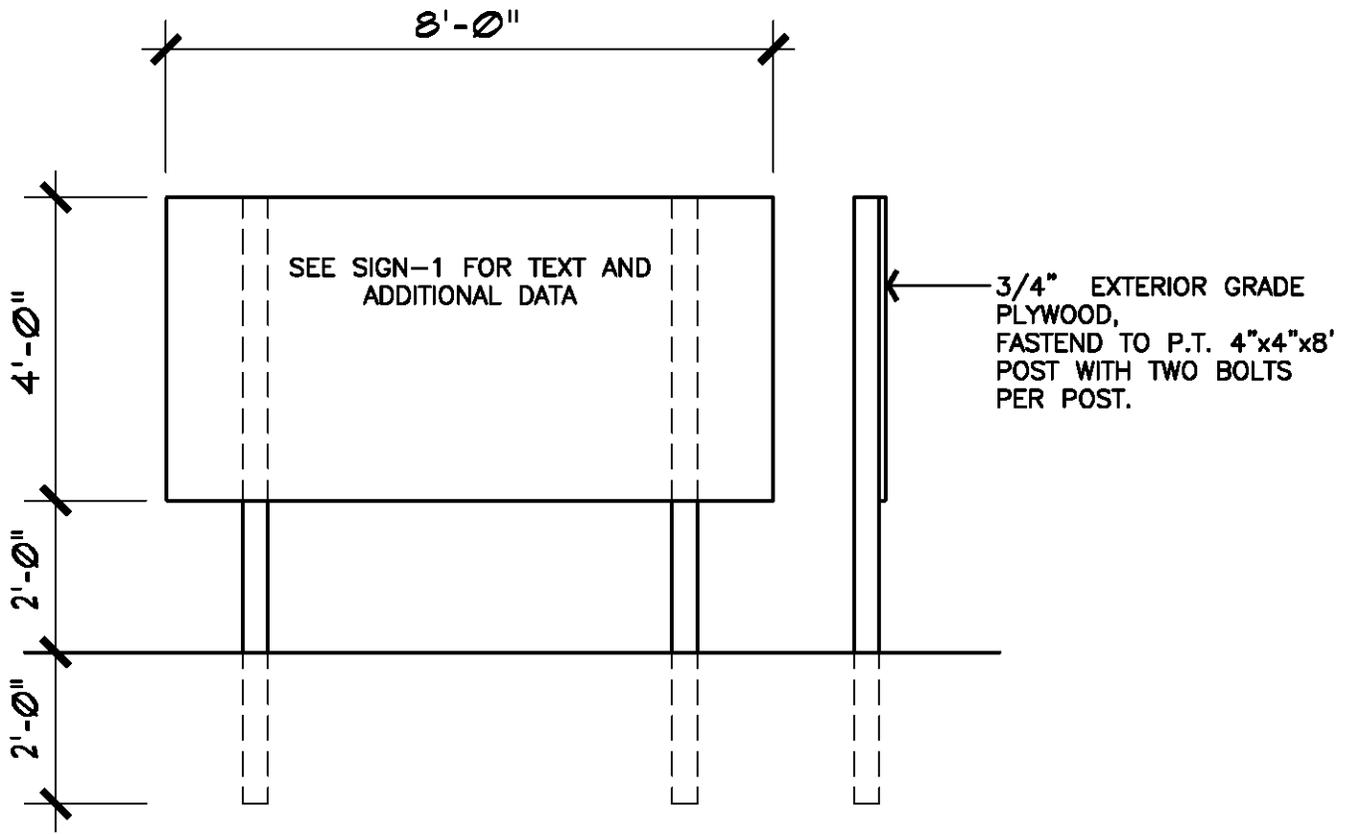
**Colors**

Blue: Sherwin Williams Naval SW6244  
 Green: Sherwin Williams Center Stage SW6920  
 White: Sherwin Williams Pure White SW7005

**SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR**

scale: 3"  3"

**Font**  
 Franklin Gothic



CONTRACT ITEM 100 – AUTOMATIC BAR SCREEN INSTALLATION AND PUMP  
STATION MODIFICATIONS

Provide, install and test one (1) automatic bar screen system and one (1) slide gate to replace one existing manual bar rack at the University Pump Station. The existing bar rack will be removed and provided to the City and the existing skylight assembly over the pump station channel will be removed. The scope of work includes installation of a concrete slab over the existing skylight opening to assist in supporting the new bar screen equipment and washer/compactor system for removal of the screenings to the dumpster. A new concrete slab will be installed over the existing stairwell to support the screenings dumpster. The dumpster area will be covered by a newly installed canopy. The existing magnesium hydroxide tank shall be removed and the existing bioxide tank and chemical feed system will be relocated in coordination with chemical supplier to the magnesium hydroxide tank's location and placed on a new slab. Provide all necessary demolition of slabs and miscellaneous concrete and metals. Remove and replace handrail including repair of concrete at handrail anchoring and support as indicated and specified herein. Work also includes restoration and all associated electrical and instrumentation and control work.

Furnishing all labor, materials, and equipment to provide uninterrupted by-pass pumping during construction of the project. The by-pass pumping system will provide continuous wastewater flow from the influent manhole to the forcemain bypass connection as designated on the drawings. The work will include pipe plug installations and flow control requirements and removal and replacement of asphalt roadway, and modification of the manholes to accommodate suction piping for the pumping system.

Any and all work not specified in additional Contract Items is the responsibility of the contractor and will be included in the lump sum price.

Payment for Lump Sum Work will be made at the appropriate Contract Lump Sum Price.

CONTRACT ITEM 200- COATING WITHIN PUMP STATION CONCRETE CHANNEL AND  
WETWELL

Contractor shall furnish all labor, materials, and equipment to remove debris, clean and dry the pump station channels and wetwell, as shown and required for preparation of the concrete surface for application of the corrosion resistant coating system. This work includes inspection, removal and disposal of the damaged PVC liner system, and preparation of the surface interface where the liner was removed and the concrete is to be coated. The extent and quantity of work will be determined once the pump station channels are cleaned and inspected.

Payment for PVC linear removal (if applicable) and the proposed epoxy coating system for the channel walls will be made at the Contract Unit Price of per square foot.

CONTRACT ITEM 300 – CONCRETE REPAIR AND RESTORATION – Crack Treatment

The Contractor shall furnish all labor, materials and equipment to repair concrete at the existing structures complete as shown on the Plans, specified, and directed by the Engineer.

The concrete restoration shall conform to the requirements shown on the drawings and Workmanship and Materials section W63 of the specifications. All work shall be done in strict accordance with the manufacturer's instructions.

The work comprises installing an approved concrete repair material and protective coating system as specified including surface preparation, cleaning, application of hydraulic cement or other materials and means to fill voids (to stop infiltration), curing, pressure washing, protection of adjacent facilities, restoring all disturbed areas to preconstruction condition or better, and all appurtenant work.

Concrete Restoration will be categorized based on the type of the repair per the Contract Drawings (Sheet S-5; Repair Details) as follows:

#### Crack Treatment – Detail C

Only one pay item shall be used per repair type. Concrete Restoration pay items shall not be compounded.

Payment for the concrete repair will be made at the Contract Unit Price of per linear foot.

#### CONTRACT ITEM 400 – CONCRETE REPAIR AND RESTORATION – Hairline Crack Repair

The Contractor shall furnish all labor, materials and equipment to repair concrete at the existing structures complete as shown on the Plans, specified, and directed by the Engineer.

The concrete restoration shall conform to the requirements shown on the drawings and Workmanship and Materials section W63 of the specifications. All work shall be done in strict accordance with the manufacturer's instructions.

The work comprises installing an approved concrete repair material and protective coating system as specified including surface preparation, cleaning, application of hydraulic cement or other materials and means to fill voids (to stop infiltration), curing, pressure washing, protection of adjacent facilities, restoring all disturbed areas to preconstruction condition or better, and all appurtenant work.

Concrete Restoration will be categorized based on the type of the repair per the Contract Drawings (Sheet S-5; Repair Details) as follows:

#### Hairline Crack Repair – Detail D

Only one pay item shall be used per repair type. Concrete Restoration pay items shall not be compounded.

Payment for the concrete repair will be made at the Contract Unit Price of per linear foot.

#### CONTRACT ITEM 500 – CONCRETE REPAIR AND RESTORATION – Concrete Repair

The Contractor shall furnish all labor, materials and equipment to repair concrete at the existing structures complete as shown on the Plans, specified, and directed by the Engineer.

The concrete restoration shall conform to the requirements shown on the drawings and Workmanship and Materials section W63 of the specifications. All work shall be done in strict accordance with the manufacturer's instructions.

The work comprises installing an approved concrete repair material and protective coating system as specified including surface preparation, cleaning, application of hydraulic cement or other materials and means to fill voids (to stop infiltration), curing, pressure washing, protection of adjacent facilities, restoring all disturbed areas to preconstruction condition or better, and all appurtenant work.

Concrete Restoration will be categorized based on the type of the repair per the Contract Drawings (Sheet S-5; Repair Details) as follows:

Concrete Repair – Detail E

Only one pay item shall be used per repair type. Concrete Restoration pay items shall not be compounded.

Payment for the concrete repair will be made at the Contract Unit Price of per square foot for the applicable concrete repair thickness.

#### CONTRACT ITEM 600 – CONTINGENCY

The Contractor shall include a One Hundred Thousand Dollar (\$100,000) contingency sum, to be included as part of the total bid amount for this contract. The contingency is for the purpose of compensating the Contractor for any incidental work that may arise as construction operations proceed and was not addressed as part of the original work portrayed in the Plans and Specifications.

The One Hundred Thousand Dollar Thousand Dollar (\$100,000) contingency sum if an upset limit. Any amount of the contingency shall be paid only after negotiation.

## **SECTION 07081**

### **FLASHING AND SHEET METAL**

#### **PART 1 - GENERAL**

##### **1-1. SCOPE.**

**1-1.01.** Contractor shall furnish all labor, materials, equipment and incidentals required to provide and install flashing and sheet metal as shown and as specified.

**1-1.02.** Contract drawings show only functional features and some of the required external connections. They do not show all components required for a complete installation nor exact dimensions particular to any manufacturer's equipment. Contractor shall supply all parts, devices and equipment necessary to meet the requirements of the Contract Documents and shall make all dimensional adjustments particular to the equipment being furnished. All costs associated with such changes and adjustments shall be considered as being included in the price bid for the work shown and specified.

**1-1.03.** Coordination: Review installation procedures under other section and coordinate the installation of items that must be installed.

##### **1-2. SUBMITTALS.**

1-2.01. Product data: Indicate product description, finishes and installation instructions, including interface with adjacent materials and surfaces.

1-2.02. Shop drawings: Indicate material types, sizes, shapes, thicknesses, finishes, fabrication details, joint details, anchors, connections, expansion joints, and relations to adjacent work.

Draw details and profiles to quarter size scale.

Include on detailed shop drawings, locations of sleepers and required fastening strips to secure metal work where sheet metal is applied to other than wood surfaces.

1-2.03. Samples, submit as follows:

1. Special finishes: 6" x 6" samples of manufacturer's standard colors for Engineer's color selection, including a clear coated mill finish sample.
2. Manufactured expansion joint covers, copings, gravel stops, flashing reglets, and other flashing items: 1'-0" length in style and finish specified.

1-2.04. Quality control submittals: Certificates: Submit certificates indicating materials supplied or installed are asbestos free.

##### **1-3. QUALITY ASSURANCE.**

1-3.01. Reference Standards. Comply with all federal and state laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:

1. American Iron and Steel Institute (AISI)
2. American Society for Testing and Materials (ASTM)
3. Copper Development Association, Inc. (CDA)
4. Sheet metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

1-3.02. Industry Standards:

1. AISI: Stainless Steel Data Manual, 1968 Edition.
2. CDA: Contemporary Copper in Architecture, 1973 Edition.
3. SMACNA: Architectural Sheet Metal Manual, 4th Edition, October 1987.

1-3.03. Pre-installation conference: Prior to beginning work, conference will be held to review work to be accomplished.

**1-4. DELIVERY, STORAGE AND HANDLING.** Acceptance at site: Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Reject and promptly remove damaged materials from site.

Storage and protection: Store materials off ground, under cover. Protect from damage and deterioration.

**1-5. SEQUENCING AND SCHEDULING.** Use flat stock matching respective roofing for shop fabricated flashings, closures and accessories.

**1-6. WARRANTY.** Warrant flashing and sheet metal work to be free of defects in materials and workmanship; combine warranty with roofing warranty.

Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

## **PART 2 - PRODUCTS**

### **2.1. MATERIALS.**

2-1.01. Sheet metal:

General: Follow gauge, thickness, or weight requirements in SMACNA Manual for intended use, and as indicated in the drawings.

2-1.02. Soldering materials:

Solder: Meeting ASTM 032-76, alloy grade 50A, 50% pig lead and 50% block tin.

Solder flux for:

- a. Stainless steel and copper: Muriatic acid neutralized with zinc.
- b. Lead: Non-corrosive rosin.

2-1.03. Fasteners: Same material or compatible with sheet metal being fastened.

1. Nails: Flathead, needle point, not less than 12 gauge; sufficient length to penetrate substrate 1" minimum.
2. Expansion shields: Lead sleeves.
3. Screws: Self-tapping type with round heads.
4. Bolts: Furnished complete with nuts and washers.
5. Rivets: Round head, solid shank.
6. Blind clips and cleats: Same gauge as sheet metal.

2-1.04. Caulk: Sonneborn NP-1 Flexible Lap Sealant. G.E. Silicone as shown.

## **2-2. FABRICATION.**

2-2.01. Shop Assembly:

General: Fabricate sheet metal in accord with reviewed shop drawings and industry standards. Form sheet metal work with clear, sharp and uniform arises. Hem exposed edges. Fabricate corners with minimum 2'-0" returns each side of return; fully seal joints.

Stainless steel, aluminum and copper materials: Roughen edges of stainless steel with emery cloth before soldering.

Solder sheet metal joints with heavy, well heated coppers. Pre-tie joints not less than 1-1/2" wide. Sweat solder through seam's full width. Provide 1" minimum soldered joints.

Neutralize remaining acid with ammonia or baking powder solution; rinse with water.

Provide linear sheet metal items in 10'-0" sections minimum, except as otherwise noted.

Form flashing using single pieces for full width.

Form specified sheet metal items in accord with SMACNA details and existing adjacent work; gauge indicated in SMACNA description of particular plate, but no less than .038" thickness.

## **PART 3 - EXECUTION**

### **3-1. INSPECTION.**

**3-1.01.** Verification of Conditions: Verify locations of all roof openings and penetrations are in accord with reviewed shop drawings.

Examine conditions and substrates under which products of this section are to be installed; submit written notification of unacceptable conditions or substrates.

Submit copy of installer's report to the Engineer within 72 hours of report receipt.

Proceeding with construction activity of this section:

- a. Prior to correction of unacceptable conditions or substrates are prohibited.
- b. Indicates installer's acceptance of conditions and substrates.

### **3-2. INSTALLATION.**

**3-2.01.** Sheet Metal: Install work in accord with reviewed shop drawings and industry standards. Provide sheet metal items true to line, without buckling, creasing, warp or wind in finished surfaces.

Coordinate flashing at roof surfaces with roofing work to provide weathertight condition at roof terminations.

Perform field joining of lengths specified for shop fabrication, but in lengths no shorter than 10'-0" except at closure pieces.

Isolate dissimilar materials to prevent electrolysis. Separate using bituminous paint or roofing felt.

Seaming:

- a. Comply with SMACNA Plates #99, #100 and other applicable plates.
- b. Flat-lock seams: Finish not less than 3/4" wide.
- c. Soldered lap seams: Finish not less than 1" wide.
- d. Other lap seams: Overlap not less than 4" unless otherwise indicated.
- e. Seams: Orient properly for direction of water flow.
- f. Flatlock seams with cleats soldered.
- g. Lap seams occurring in members sloping 45" or more, 4" minimum; bed in with butyl sealant.
- h. Perform soldering in same manner indicated in FABRICATION Article.

Secure sheet metal items using continuous cleats, clips and blind fasteners as indicated; exposed face fastening is prohibited.

Fastening:

Nails: Confine to one edge only of flashing 1'-0" or less in width. Space nails at 4" O.C. Maximum. Provide neoprene washers for nails.

Cleats: Continuous; form to profile of item being secured.

Clips: Minimum 2" wide and continuous; form to profile of item being secured. The clips are continuous and the cap flashing replacement.

Form joints in linear sheet metal to allow for 1/2" minimum expansion at 20' -0" O.P.C. maximum and 8'-0" from corners. Provide 1'-0" wide back-up plate at intersections. Form plates to profile of sheet metal items. Apply linear sheet metal items in full bed of butyl or urethane caulk over back-up plate.

**END OF SECTION**

07081

## SECTION 07100

### WATERPROOFING AND MOISTUREPROOFING

#### **PART 1 - GENERAL**

**1-1. SCOPE.** This section specifies waterproofing and moistureproofing of concrete surfaces and below grade masonry surfaces.

#### **PART 2 - PRODUCTS**

##### **2.1. MATERIALS.**

2-1.01. Waterproofing and Moistureproofing Coatings: Waterproofing and moistureproofing coating shall be PVC lining where shown on the Drawings or epoxy resin. Acceptable epoxy resin products are Tnemec Series 69, Ameron Amercoat 351, and Porter 7600 Series Magna Coat. Each of these is a polyamidoamine epoxy.

2-1.02. Waterproofing Membrane: Waterproofing membrane shall be Bituthene as manufactured by W.R. Grace and Company, Jiffy Seal as manufactured by Protecto Wrap Co., or equal. Volclay Panels or Bentonize bentonite system are acceptable alternates, except where membrane is required between concrete slabs or where there is concrete over waterproofing membrane.

Protective Board: Protective board shall be 1/2-inch asphalt impregnated celotex insulation board.

2-1.03. Moistureproofing Underlay:

1. Plastic Membrane: Plastic membrane for moistureproofing underlay shall be polyethylene film with a thickness of 6 mils.
2. Pressure Sensitive Tape: Pressure sensitive tape shall be 2-inch wide polyethylene tape.

#### **PART 3 - EXECUTION**

##### **3-1. CONSTRUCTION.**

3-1.01. Waterproofing Coating:

Location: Waterproofing coating shall be applied to the water side of walls and bottoms of channels or tanks which are common with rooms, tunnels or galleries to be occupied by equipment, piping, conduit, or personnel.

Surface Preparation: New concrete to be waterproofed shall have aged at least 28 days and allowed to dry to a moisture content recommended by the coating manufacturer. Loose concrete and laitance shall be removed from new concrete surfaces by abrasive blasting. Voids and cracks shall be repaired as specified in Section WM-4 Concrete, Mortar and Grout Materials.

Application: Two or more coats at manufacturer's recommended dry film thickness. Total dry film thickness

shall be minimum 16 mils, final coat shall be black. Drying time between coats shall be as recommended by the coating manufacturer.

### 3-1.02. Moistureproofing Coating:

**Location:** Moistureproofing coating shall be applied to the earth side of concrete or masonry walls which are below grade and are common with rooms, tunnels, or galleries to be occupied by equipment, piping, or personnel. Moistureproofing coating is not required for walls to be provided with waterproofing membrane or for walls which are poured directly against an excavated surface.

**Surface Preparation:** Preparation of concrete shall conform to Paragraph Surface Preparation. Masonry surfaces shall be allowed to age for at least 28 days. Holes or other joint defects shall be filled with mortar and repointed. Loose or splattered mortar shall be removed by scraping and chipping. Masonry surfaces shall be cleaned with clear water by washing and scrubbing. Muriatic acid shall not be used. After cleaning, masonry surfaces shall be sealed or filled with sealer or block filler compatible with the specified primer. Sealer or filler shall dry a minimum of 48 hours prior to application for prime coat.

**Application:** One or more coats shall be applied at the manufacturer's recommended dry film thickness. The number of finish coats shall be sufficient to produce a total dry film thickness of at least 16 mils. Drying time between coats shall be as recommended by the coating manufacturer.

### 3-1.03. Waterproofing Membrane:

**Location:** Waterproofing membrane shall be applied to surfaces as specified.

**Surface Preparation:** Concrete surfaces to receive waterproofing membrane shall be clean, dry, and free of voids, spalled areas, loose aggregate, and sharp protrusions, with no coarse aggregate visible.

**Application:** Waterproofing membrane shall be applied in accordance with the manufacturer's recommendations. Surfaces shall be clean and primed prior to application of the membrane. The manufacturer's representative shall be present during initial application to certify that the Contractor's procedures comply with manufacturer's specifications. Pipes or conduits entering structures shall be watertight. The protective board shall be placed directly against the membrane prior to backfilling. Where the membrane is turned up from the base of the walls, at angles in walls, and at any other place where the membrane may be subjected to unusual strain, strips consisting of two additional plies of membrane shall be applied.

### 3-1.04. Moistureproofing Underlay:

**Location:** Unless otherwise specified, moistureproofing underlay shall be provided under concrete floors or floating slabs-on-grade including those deposited on drain rock.

**Surface Preparation:** Backfilled surfaces to receive moistureproofing underlay shall be leveled off and smoothed over to minimize contact with sharp edges.

**Application:** At joints, moistureproofing membrane shall be lapped 12 inches and sealed with pressure sensitive tape. Where pipes and conduits pass through the membrane, they shall be wrapped tightly with separate sheets of membrane which shall then be sealed with tape to the main membrane. Reinforcing steel or wire mesh shall be supported by chairs with flat bases to protect the membrane.

**END OF SECTION**

## **SECTION 09970**

### **PVC LINER REMOVAL AND CONCRETE REPAIR**

#### **PART 1 – GENERAL**

##### **1-1. SCOPE**

This section covers field removal of the existing PVC protective liner inside the existing sewer influent channel and repairs, including surface preparation, protection of surfaces, and inspection.

##### **1-2. GENERAL**

The Contractor shall remove all loose and/or damaged PVC liner within the specified limits, as necessary and indicated in the drawings, shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, Contractor shall comply with the manufacturer's minimum recommendations. When equivalent products are acceptable to Engineer, Contractor shall comply with this Specification.

- A. Governing Standards: All cleaning, surface preparation, coating application, thickness, testing, and coating materials (where available) shall be in accordance with the referenced standards of the following AWWA, ANSI, NACE, SSPC, NSF, and ASTM.
- B. Delivery and Storage: All coating products shall be received and stored in accordance with the manufacturer's recommendations.

##### **1-3. SUBMITTALS**

Complete drawings, details, and specifications, indicating the PVC liner removal and repair area shall be submitted in accordance with the Submittals section.

##### **1-4. QUALITY ASSURANCE**

PVC liner Removal and Repairs: The PVC liner repair coating manufacturer shall review and approve in writing the manufacturer's written recommendations for the PVC liner and the intended service. Any variations from the Specifications or the manufacturers published recommendations shall be submitted in writing and approved by the manufacturer. The manufacturer shall observe the surface preparation, removal, and application of the repair and submit a written report of his observations and any additional recommendations.

#### **PART 2 – PRODUCTS**

##### **2-1. ACCEPTABLE MANUFACTURERS**

- A. Manufacturers: Acceptable manufacturers to provide products and observe the repairs of the existing PVC liner shall be:
  - 1. Epoxytec
  - 2. Or equal

## **PART 3 – EXECUTION**

### **3-1. SURFACE PREPARATION**

- A. Cut out and remove PVC liner PVC areas identified for repair; which are loose, blistering, delaminating, and/or otherwise compromised with bond strength and continue to remove PVC liner until visible concrete substrate is exposed and until reaching tightly adhered to the PVC liner, where material no longer peels.
  
- B. Concrete preparation
  - i. Protrusions such as from burrs, sharp edges, fins, and concrete spatter shall be removed during surface preparation.
  - ii. Voids and other defects that are at or near the surface shall be exposed during surface preparation.
  - iii. All concrete that is not sound shall be removed so that only sound concrete remains.
  - iv. Surface preparation must achieve a clean and sound substrate in accordance with SSPC-SP13/NACE No. 6 “Surface Preparation of Concrete.”
    - a. High pressure water cleaning or water-jetting, and/or pre-approved dry or wet abrasive blasting may be necessary in order to achieve acceptable surface preparation free of all foreign material, laitance, oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, and/or other contaminants.
    - b. An ICRI profile of CSP 3-5 shall be achieved.
  - v. All materials resulting from the cleaning shall be caught at the base of each structure and removed prior to applying specified products.
  - vi. The prepared surface shall be washed down using potable water before continuing repairs on PVC liner.
  
- C. PVC liner preparation
  - i. Prepare PVC liner six inches (6”) min. from the edge, first with SSPC-SP1 “Solvent Cleaning,” in order to remove of all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants with solvent, vapor, cleaning compound, alkali, emulsifying agent, and/or steam.
  - ii. After solvent cleaning, lightly abrade the cleaned area via sanding, and/or wire brushing. Utilizing one motion and direction (not circular), with sharp, coarse scoring abrasions, avoid polishing effect.
  - iii. Contractor shall create a mechanical anchoring assist system to optimize the bond at the edge of the PVC liner and join the PVC liner and the concrete wall as a monolithic system.

- a. At PVC liner edges, one-inch from the edge, affix an anchoring strip of 316 stainless steel, two-inches wide, 3/8" thick with 316 stainless steel concrete tapcons at two-foot on center spacing, over the PVC liner, embedded into the concrete a minimum of three-inches.

D. All materials resulting from the cleaning shall be caught at the base of each structure and removed prior to applying specified products.

E. Wash down with clean water and allow water to dry. Forced air is acceptable.

### **3-2. ACTIVE LEAKS**

A. Contactor shall inspect the repairs for surface water and active leaks. No leaks are to be present.

- i. When leaks are not readily identifiable upon the cleaning operation, the use of blowers to dry the interior shall be used for positive identification of leaks and weeping areas.

- ii. Hydraulic cement will be used based on manufacturers recommendations.

- iii. The work consists of hand applying a dry quick-setting cementitious mix designed to instantly stop running water or seepage.

- iv. The certified applicator shall apply material in accordance with manufacturers' recommendations.

B. The area to be repaired must be clean and free of all debris.

C. Proper applications should not require any special mixing of product or special curing requirements after application.

### **3-3. REPAIR AND SECTIONAL RELINING**

Contractor shall apply a highly adhesive, chemical resistant, high strength epoxy coating to the prepared surface. Contractor shall mix and apply the coating epoxy according to WM-63.

### **3-4. INSTALLATION CHECK**

An experienced, competent, and authorized representative of the manufacturer shall visit the site of the work and inspect, check, and verify proper repair/ transition from the removed PVC liner to the concrete surface. The final inspection shall take place after a minimum of 24 hours of application. Final inspection must yield no visible signs of pin-holing or holidays. Upon final inspection and approval by the manufacturer, Contractor shall submit to the Owner and Engineer written documentation the PVC removal and replacement has passed manufacturer's inspection and work within the designated area can be returned to service.

**END OF SECTION**

**SECTION 11000**

**GENERAL REQUIREMENTS FOR EQUIPMENT**

**PART 1 – GENERAL**

**1-1. SCOPE**

General: This section specifies general requirements which are applicable to all mechanical equipment. The Contractor is responsible for ensuring that all mechanical equipment meets the requirements of this section in addition to the specific requirements of the individual equipment specification section.

Equipment Lists: Equipment lists, presented in these specifications and as specified on the Drawings, are included for the convenience of the City’s Engineer and Contractor and are not complete listings of all equipment, devices and material to be provided under this contract. The Contractor agrees to prepare his own material and equipment takeoff lists as necessary to meet the requirements of this project manual.

**1-2. QUALITY ASSURANCE**

Arrangement: The arrangement of equipment shown on the Drawings is based upon information available to the City at the time of design and is not intended to show exact dimensions peculiar to a specific manufacturer. The Drawings are, in part, diagrammatic, and some features of the illustrated equipment installation may require revision to meet actual equipment installation requirements. The contractor shall, in determining the cost of installation, include these differences as part of his bid proposal. Structural supports, foundations, connected piping, valves, and electrical conduit specified may have to be altered to accommodate the equipment provided. No additional payment will be made for such revisions and alterations.

References: This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ABMA Std 9-90	Load Ratings and Fatigue Life for Ball Bearings
ABMA Std 11-90	Load Ratings and Fatigue Life for Roller Bearings
ANSI B1.1 89	Unified Screw Threads
ANSI B1.20.1 83	Pipe Threads, General Purpose (Inch)
ANSI B16.1	Gray Iron Pipe Flanges and Flanged Fittings, (Classes 25, 125 and 250)
ANSI B16.1 89	Cast Iron Pipe Flanges and Flanged Fittings, Class 125
ANSI B18.2.1 81	Square and Hex Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws, and Log Screws
ANSI B18.2.2 87	Square and Hex Nuts

Reference	Title
ANSI S2.19	Mechanical Vibration – Balance Quality Requirements of Rigid Rotors, Part 1: Determination of Permissible Unbalance, Including Marine Applications

Unit Responsibility: The unit responsibility for equipment systems made up of two or more components shall be the sole responsibility of the equipment manufacturer.

The Contractor shall assure that all equipment systems provided for the project are products for which unit responsibility has been accepted by the responsible manufacturer. The detailed specification requires the Contractor to furnish a certificate from the Unit Responsibility Manufacturer, and shall be signed by an officer of the manufacturer’s corporation and shall be notarized. No other submittal material will be processed until a Certificate of Unit Responsibility has been received and has been found to be satisfactory. Failure to provide acceptable proof that the unit responsibility requirement has been satisfied will result in withholding approval of progress payments for the subject equipment even though the equipment may have been installed in the work.

Balance: Unless specified otherwise, all rotating elements in motors, pumps, centrifuge and centrifugal compressors shall be fully assembled, including coupling hubs, before being statically and dynamically balanced. All rotating elements shall be balanced to the following criteria:

$$e = \frac{W}{16N}$$

1. Where:

- e = imbalance, ounce-inches, maximum
- W = Weight of the balanced assembly, pounds mass
- N = Maximum operational speed, rpm

Where specified, balancing reports, demonstrating compliance with this requirement, shall be submitted as product data.

**PART 2 – PRODUCTS**

**2-1. FLANGES AND PIPE THREADS**

Flanges on equipment and appurtenances provided under this section shall conform in dimensions and drilling to ANSI B16.1, Class 125. Pipe threads shall conform in dimension and limits of size to ANSI B1.1, coarse thread series, Class 2 fit.

Threaded flanges shall have a standard taper pipe thread conforming to ANSI B1.20.1. Unless otherwise specified, flanges shall be flat faced.

Flange assembly bolts shall be heavy pattern, hexagonal head, carbon steel machine bolts with heavy pattern, hot pressed, hexagonal nuts conforming to ANSI B18.2.1 and B18.2.2. Threads shall be Unified Screw Threads, Standard Coarse Thread Series, Class 2A and 2B, ANSI B1.1.

## **2-2. BEARINGS**

Unless otherwise specified, equipment bearings shall be oil or grease lubricated, ball or roller type, designed to withstand the stresses of the service specified. Each bearing shall be rated in accordance with the latest revisions of ABMA Methods of Evaluating Load Ratings of Ball and Roller Bearings. Unless otherwise specified, equipment bearings shall have a minimum B 10 rating life of 100,000 hours.

The rating life shall be determined using the maximum equipment operating speed.

Grease lubricated bearings, except those specified to be factory sealed and lubricated, shall be fitted with easily accessible grease supply, flush, drain and relief fittings. Extension tubes shall be used when necessary. Grease supply fittings shall be standard hydraulic alemite type.

Oil lubricated bearings shall be equipped with either a pressure lubricating system or a separate oil reservoir type system. Each oil lubrication system shall be of sufficient size to safely absorb the heat energy normally generated in the bearing under a maximum ambient temperature of 60 degrees C and shall be equipped with a filler pipe and an external level indicator gage.

All bearings accessible to touch and located within 7 feet measured vertically from floor or working level or within 15 inches measured horizontally from stairways, ramps, fixed ladders or other access structures shall either incorporate bearing housings with sufficient cooling to maintain surface temperature at 65 degrees C or less for continuous operation at bearing rated load and a 50 degrees C ambient temperature or appropriate shielding shall be provided that will prevent inadvertent human contact.

## **2-3. V-BELT ASSEMBLIES**

Unless otherwise specified, V-belt assemblies shall be Dodge Dyna-V belts with matching Dyna-V sheaves and Dodge Taper-Lock bushings, Wood's Ultra-V belts with matching Ultra-V sheaves and Wood's Sure-Grip bushings, or approved equal.

Sheaves and bushings shall be statically balanced. Additionally, sheaves and bushings which operate at a peripheral speed of more than 5500 feet per minute shall be

dynamically balanced. Sheaves shall be separately mounted on their bushings by means of three pull up grub or cap tightening screws. Bushings shall be key seated to the drive shaft.

Belts shall be selected for not less than 150 percent of rated driver horsepower and, where two sheaves sizes are specified, shall be capable of operating with either set of sheaves. Belts shall be of the antistatic type where explosion-proof equipment is specified.

#### **2-4. PUMP SHAFT SEALS**

**General:** Seals for water and wastewater pump shafts shall be either stuffing box or mechanical seals. Unless specified otherwise, stuffing boxes and mechanical seals shall conform to the requirements set forth in this paragraph.

**Mechanical Seals:** Where mechanical seals are specified, the seal shall be of a nondestructive (non-fretting) type which requires no wearing sleeve for the shaft. Shafts for pumps specified with mechanical seals shall be furnished with no reduction in size through the seal area. Mechanical seals shall be the cartridge type, requiring no field assembly, other than insertion into the pump. Metal parts shall be Type 316 or 316L stainless steel. Springs shall be Hastelloy C. Rotary faces shall be tungsten carbide or silicon carbide. Stationary faces shall be ceramic, tungsten carbide, or silicon carbide.

Unless otherwise specified, mechanical seals for overhung shaft, constant speed pumps and split case, centrifugal pumps shall be self-aligning, single, rotary type, Chesterton 155, Crane 88 S, or approved equal.

Unless otherwise specified, mechanical seals for variable speed, overhung shaft pumps shall be double, balanced, self-aligning type, Crane 88 D, Chesterton 222 or 255, or approved equal.

Boxes for mechanical seals on pumps for contaminated water service (sludge, grit, wastewater, scum, reclaimed water, etc.) shall be drilled and tapped for installation of clean water barrier fluid supply piping.

Seals for all vertical pumps (whether column or volute type) shall be provided with a second flush connection. Vertical pumps shall have a vent valve attached to the mechanical seal to eliminate air from the seal chamber prior to pump start; start-up procedures shall include venting instructions; and for remotely started pumps, the vent system shall be automated. Where specified in the detailed specifications, permissive confirmation automatic vent systems shall be provided.

**Shaft Packing:** Where shaft packing is specified, stuffing boxes shall be tapped to permit introduction of seal liquid and shall hold a minimum of five rows of packing. Stuffing boxes shall be face attached. Stuffing box and shaft shall be suitable for field installation, without machining or other modifications, of the mechanical seal specified in paragraph 11000-2-4.B for the applicable pump and operating conditions.

Unless otherwise specified, lantern rings shall be bronze or Teflon, packing shall be die molded packing rings of non-asbestos material suitable for the intended service and as

recommended by the manufacturer, and glands shall be bronze, two piece split construction. Lantern rings shall be of two-piece construction and shall be provided with tapped holes to facilitate removal. Lantern rings shall be drilled and tapped 1/4 NC-20.

Threaded lantern ring removal tools shall be provided with spare parts for each pump. The impeller end of the packing on all but line shaft pumps with external source water lubricated bearings shall be fitted with a SpiralTrac, Version P packing protection system as manufactured by EnviroSeal Engineering Products, Ltd, Nova Scotia, Canada.

The section of each shaft or impeller hub that extends through or into the stuffing box shall be fitted with a replaceable stainless steel sleeve with a Brinell hardness of not less than 500. The sleeve shall be held to the shaft to prevent rotation and shall be gasketed to prevent leakage between the shaft and the sleeve.

Minimum shaft sleeve thickness shall be 3/8 inch.

## **2-5. COUPLINGS**

Unless otherwise specified in the particular equipment sections, equipment with a driver greater than 1/2 HP, and where the input shaft of a driven unit is directly connected to the output shaft of the driver, shall have its two shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment and end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the stub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal to-metal contact between the driver and the driven unit. Each coupling shall be sized and provided as recommended by the coupling manufacturer for the specific application, considering horsepower, speed of rotation, and type of service.

Where torque or horsepower capacities of couplings of the foregoing type is exceeded, Thomas Rex, Falk Steel Flex, or approved equal, couplings will be acceptable provided they are sized in accordance with the equipment manufacturer's recommendations and sizing data are submitted. They shall be installed in conformance to the coupling manufacturer's instructions.

## **2-6. GUARDS**

Exposed moving parts shall be provided with guards which meet the requirements of OSHA. Guards shall be fabricated of 14 gage steel, 1/2-13-15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and shall be designed to be readily removable to facilitate maintenance of moving parts. Reinforced holes shall be provided. Lube fittings shall be extended through guards.

## **2-7. CAUTION SIGNS**

Equipment with guarded moving parts which operates automatically or by remote control shall be identified by signs reading "CAUTION – AUTOMATIC EQUIPMENT MAY START AT ANY TIME". Signs shall be constructed of fiberglass material, minimum 1/8-inch-thick, rigid, suitable for post mounting. Letters shall be white on a red background. The sign size and pattern shall be as shown on the

Drawings. Signs shall be installed near guarded moving parts.

#### **2-8. GAGE TAPS, TEST PLUGS AND GAGES**

Gage taps shall be provided on the suction and discharge sides of pumps, blowers and compressors. Pressure and vacuum gages shall be provided where specified. Gage taps, test plugs, and gages shall be as specified in Divisions 13 and 15, respectively.

#### **2-9. NAMEPLATES**

Nameplates shall be provided on each item of equipment and shall contain the specified equipment name or abbreviation and equipment number. Equipment nameplates shall be engraved or stamped stainless steel and fastened to the equipment in an accessible location with stainless steel screws or drive pins.

#### **2-10. LUBRICANTS**

The Contractor shall provide for each item of mechanical equipment a supply of the lubricant required for the commissioning period. Lubricants shall be of the type recommended by the equipment manufacturer and shall be products of the City's current lubricant supplier. The Contractor shall limit the various types of lubricants by consolidating them, with the equipment manufacturer's approval, into the least number of different types. Not less than 90 days before the date shown in his construction schedule for starting, testing and adjusting equipment, the Contractor shall provide the City with three copies of a list showing the required lubricants, after consolidation, for each item of mechanical equipment. The list shall show estimated quantity of lubricant needed for a full year's operation, assuming the equipment will be operating continuously.

#### **2-11. ANCHOR BOLTS**

Anchor bolts shall be designed for lateral forces for both pullout and shear in accordance with the manufacturers recommendations and as stated in the drawings. Unless otherwise stated in the detailed specification, anchor bolt materials shall conform to the provisions of manufacturers recommendations and as stated in the drawings. .

#### **2-12. SPARE PARTS**

Spare parts, wherever required by detailed specification sections, shall be stored in accordance with the provisions of this paragraph. Spare parts shall be tagged by project equipment number and identified as to part number, equipment manufacturer, and subassembly component (if appropriate). Spare parts subject to deterioration such as ferrous metal items and electrical components shall be properly protected by lubricants or

desiccants and encapsulated in hermetically sealed plastic wrapping. Spare parts with individual weights less than 50 pounds and dimensions less than 2 feet wide, or 18 inches high, or 3 feet in length shall be stored in a wooden box with a hinged wooden cover and locking hasp. Hinges shall be strap type. The box shall be painted and identified with stenciled lettering stating the name of the equipment, equipment numbers, and the words "spare parts." A neatly typed inventory of spare parts shall be taped to the underside of the cover.

### **PART 3 – EXECUTION**

#### **3-1. INSTALLATION**

Installation of equipment accessories included in this section shall be as recommended by the equipment manufacturer unless otherwise specified in the individual equipment specification section.

**END OF SECTION**

## SECTION 11002

### RIGID EQUIPMENT MOUNTS

#### **PART 1 – GENERAL**

##### **1-1. DESCRIPTION**

##### **1-2. SCOPE**

This section specifies minimum requirements for rigid equipment mounts (baseplates, soleplates, and mounting blocks) and their installation on equipment pads. Completed equipment supports shall consist of equipment pads, equipment anchors, and rigid equipment mounts (baseplates, soleplates, or mounting blocks) set in grout.

##### **1-3. REQUIREMENTS**

Unless alternate requirements for equipment mounts are specified in the applicable equipment specification, the requirements of this section shall be applied to rigid mounts for all rotating or reciprocating equipment that is used to mix, convey, or pressurize fluids (gases and liquids). The requirements of this section shall also apply whenever referenced in specifications for other types of equipment. If conflict exists between this section and requirements of individual equipment manufacturers, the more restrictive requirements shall prevail. Mounting and alignment of equipment installed on equipment mounts (baseplates, soleplates, and mounting blocks) is specified in Section 11005.

##### **1-4. DEFINITIONS**

Specific equipment mounting terminology used in this section conforms to the following definitions:

- A. Baseplate: Fabricated (welded structural steel elements), cast, or plate steel base providing a common mounting element on which the legs, feet, or mounting surfaces of equipment are mounted by means of bolted connections.
- B. Soleplate: A machined plate, spanning an opening in the floor or equipment pad, providing a common mounting element on which the legs, feet, or mounting surfaces of equipment are mounted by means of bolted connections.
- C. Mounting Blocks: Multiple smaller baseplates on which individual legs, feet or equipment supports are mounted when equipment or drivers are not fastened to a common baseplate or sole plate.
- D. Equipment Pad: Concrete foundation (block or slab) supporting and elevating equipment mounts above the supporting structural floor slab or local grade.
- E. Mounting Pads: Thickened or raised areas of baseplates and soleplates where the feet or mounting surfaces of mounted equipment and drivers are bolted and/or doweled to the baseplate or soleplate.

- F. Leveling Blocks: Temporary steel blocks placed under baseplates, soleplates, or a mounting block at leveling positions (at equipment anchors) for the purpose of leveling baseplates, soleplates, or mounting blocks prior to grouting.
- G. Shims: Thin stainless steel plates of a uniform thickness installed on top of Leveling Blocks for fine adjustment of level. Shims may also be used between equipment or drivers and baseplates, soleplates, or mounting blocks for equipment alignment purposes specified in Section 11005.
- H. Wedges: Pairs of uniformly tapered metal blocks that are stacked with the tapered surfaces reversed (relative to the other wedge) so that the top and bottom surfaces of the wedges are parallel. Wedges are used between equipment pads and baseplates, soleplates, or mounting blocks for the purpose of leveling baseplates, soleplates, or mounting blocks.
- I. Mounting Stud: Threaded rod or bolts anchored to baseplates, soleplates, or mounting blocks for the purpose of mounting equipment or ancillary devices onto baseplates, soleplates, or mounting blocks.
- J. Reinforcement Dowels: Steel reinforcement rods embedded in concrete, across a cold joint, for the purpose of transferring loads or force across the joint.
- K. Machine Alignment Dowels: Tapered diameter rods inserted in tapered diameter holes for the purpose of aligning machinery. The practice of drilling tapered diameter holes through machinery and baseplates so that Machine Alignment Dowels may be inserted to facilitate alignment of machinery is known as Doweling.
- L. Leveling Position: A location on the top of a concrete equipment pad where leveling tools and equipment will be temporarily installed or used for the purpose of leveling baseplates, soleplates, and mounting blocks prior to grouting.
- M. Grout Manufacturer: Refers to the manufacturer of the epoxy grout system used for installation of rigid equipment mounts.
- N. Grout Manufacturer's Technical Representative(s): Refers to the technical representative(s) of the Grout Manufacturer.

#### **1-5. EQUIPMENT MOUNTING REQUIREMENTS**

Unless otherwise specified, equipment and drivers shall be rigidly mounted on a common cast iron or fabricated steel baseplate or soleplate grouted into place on a concrete equipment pad. Under no circumstances shall baseplates, soleplates, or mounting blocks be grouted directly to concrete slabs or floors. Equipment that uses an interdependent equipment and driver mounting configuration (equipment that is bolted onto the driver frame and equipment that supports the driver entirely from the equipment frame) may be bolted directly on concrete or grout surfaces of equipment pads if the driver is less than five horsepower. Bolting equipment directly on concrete or grout surfaces of equipment pads is not acceptable for equipment and drivers that do not have an interdependent equipment and driver mounting configuration.

**1-6. QUALITY ASSURANCE**

References: This section contains references to the following documents. It is a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed document, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/HI 1.4	Centrifugal Pumps – Installation, Operation and Maintenance
ANSI/HI 2.4	Vertical Pumps – Installation, Operation and Maintenance
API RECOMMENDED PRACTICE 686	Recommended Practices for Machinery Installation and Installation Design
ASTM E329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
MIL-PRF-907E	Anti-Seize Thread Compound, High Temperature
SSPC	Society for Protective Coatings Specifications, Vol. 2
IBC	2001 International Building Code (including local amendments)

**1-7. QUALITY CONTROL BY CONTRACTOR**

Requirements: To demonstrate conformance with the specified requirements for rigid equipment mounts, the Contractor shall provide the services of an independent testing laboratory that complies with the requirements of ASTM E329. The testing laboratory shall sample and test equipment mount related materials as indicated in this Section (11002). Costs of testing laboratory services shall be borne by the Contractor.

For equipment with drivers 20 horsepower and greater, the Contractor shall furnish the services of a grout manufacturer’s technical representative that has been factory trained by the grout manufacturer. The grout manufacturer’s technical representative shall perform training and quality control of epoxy grout installation for rigid equipment mounts as indicated in this section (11002).

## **1-8. SUBMITTALS**

The following information shall be provided in accordance with the submittal requirements specified in the General Conditions.

A. Specification: A copy of this specification section, with addendum updates included, (referenced sections need not be included for Section 11002) with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration. Copies of this specification section shall be numbered and marked (specification number and equipment number) for inclusion (filing) with the associated equipment submittal requirements.

B. Schedule: Schedule of rigid equipment mount installations specified in paragraph 11002-2.01.

C. Requirements: Name, employer and certificates or other information documenting compliance with the journeyman qualifications requirements for millwrights who will install rigid equipment mounts, as specified in paragraph 11002-3.03. C.

D. Certificates: Certificates or other documentation issued by the epoxy grout manufacturer that demonstrates that the grout manufacturer's technical representative has been factory trained on installation of epoxy grout for equipment mounts, as specified in paragraph 11002-1.02 B. 2.

E. Shop Drawings: Shop drawings for all equipment pads, equipment anchors, and baseplate, soleplate or mounting block details. Shop drawings shall depict size and location of equipment pads and reinforcement; equipment drains; equipment anchor, size, location, and projection; expansion joint locations; elevation of top of grout and grout thickness; elevation of top of baseplate; soleplate; or mounting block; size and location of electrical conduits; and any other equipment mounting features embedded in equipment pads. Shop drawings for equipment pads, equipment anchors, and baseplate, soleplate, or mounting blocks shall be numbered and marked (specification number and equipment number) for inclusion (filing) with the associated equipment submittal requirements.

## **PART 2 – PRODUCTS**

### **2-1. GENERAL**

Prior to initiating any installation efforts, the Contractor shall produce a rigid equipment mount installation schedule containing the expected dates for installing equipment

11002

anchors and preparation of equipment pads for leveling, grouting, and final equipment anchor clamping for each item of equipment. The schedule shall list the equipment, by equipment tag number, and shall list applicable equipment specification section, motor horsepower, and name of the Contractor's representative responsible for quality control during installation of rigid equipment mounts. The schedule shall be accompanied by written verification of equipment anchor clamping torque from the manufacturer of each item of equipment to be installed with rigid equipment mounts.

## **2-2. CONCRETE EQUIPMENT PADS**

Concrete equipment pads shall be as shown in the structural details for equipment pads and equipment anchors for rigid mounted equipment.

Anchor: The Contractor shall submit equipment anchor calculations for all equipment with drivers 20 horsepower and greater. Equipment anchor calculations shall demonstrate that equipment anchor size, embedment, and edge distance comply with the UBC and local governing code and are sufficient to resist the maximum lateral and vertical forces specified in paragraph 11000-2.11. Equipment anchor calculations shall be sealed by a registered structural or civil engineer licensed in the State of Florida.

## **2-3. BASEPLATES, SOLEPLATES, AND MOUNTING BLOCKS**

A. General: Unless otherwise specified, Type I baseplates, soleplates, and mounting blocks shall be a minimum of 1 inch thick for equipment with drivers 20 horsepower and larger.

Type I baseplates, soleplates, and mounting blocks shall have edges of surfaces bearing on grout rounded to a radius of not less than 0.25 inch. Horizontal corners of Type I baseplates, soleplates, or mounting blocks shall be rounded to a radius of not less than two inches to avoid producing stress risers on the grouted foundation. Grout pouring holes (minimum 4 inches in diameter for epoxy grout, minimum 2 ½ inches in diameter for cementitious nonshrink grout) shall be provided in all baseplates and soleplates and all baseplates and soleplates shall have grout release holes. Mounting blocks may be grouted without grout pouring holes provided that no dimension of the mounting block (width or length) exceeds 18 inches. Grout relief or vent holes (minimum 1 inch in diameter) shall be provided in all baseplates, soleplates, and mounting blocks. Internal stiffeners shall be provided on all cast and fabricated baseplates and shall be designed to allow free flow of grout from one section of the baseplate to another. The minimum acceptable opening in cross bracing and stiffeners shall be 2 inches high by 6 inches in width. All welds shall be continuous and free from skips, blowholes, laps and pockets.

Mounting holes for equipment anchors shall be drilled through baseplates, soleplates, and mounting blocks. Mounting holes for equipment anchors shall not be burned out and they shall not be open slots. All mounting studs shall be Type 316 stainless steel. An anti-seize or anti-galling compound, as specified in paragraph 11002-2.06, shall be applied to all mounting stud threads prior to installing nuts on mounting studs.

Terminations requiring connections to baseplates, soleplates, or mounting blocks shall be acorn nuts welded to the underside of the baseplate or nuts welded to the underside of the

baseplate and plugged with cork, plastic plugs or grease. In no case shall the fastener terminate only into the metal base. Where baseplates, soleplates, or mounting blocks are leveled using jackscrews, jackscrew threads shall be tapped in thickened pads or otherwise in sufficient metal to provide ease in adjusting level.

Mounting pads for equipment shall be machined after all welding and stress relieving and shall be coplanar within 0.002 inch per foot in all directions. Mounting pads shall extend not less than 0.5 inch beyond the perimeter of the foot or mounting surface of the mounted equipment, in any direction.

Equipment baseplates shall provide common support for the equipment and driver (and flywheel, if one is specified). Baseplates for equipment with drivers 20 horsepower and greater shall be furnished with eight transverse alignment (horizontal) positioning jackscrews for alignment of equipment drivers on horizontal surfaces of baseplates. Two of the eight transverse alignment/positioning jackscrews shall be installed in perpendicular directions in a horizontal plane at the mounting position for each corner or foot of the equipment driver. (Eight additional jackscrews shall be provided for transverse alignment of the flywheel, if flywheels are specified.)

B. Type I Baseplates: Type I baseplates shall be plate or fabricated structural steel baseplates with thickened steel mounting pads for doweling and bolting equipment to the baseplate. The baseplates shall be rectangular in shape for equipment other than centrifugal refrigeration machines and pump baseplates, which may be "T" or "L" shaped to accommodate the equipment drive and accessories. Baseplates for split case pumps shall include supports for suction and discharge elbows, if required by the specified configuration. Perimeter members shall be beams with a minimum depth equal to 1/10th of the longest dimension of the baseplate. Beam depth need not exceed 14 inches provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer.

C. Type IV Baseplates: Type IV baseplates shall be cast iron with thickened mounting pads for doweling and bolting equipment to the baseplate. Cast iron baseplates shall be sealed in accordance with the requirements for bleeding surfaces specified in Section WM-36 prior to grouting.

D. Soleplates: Where soleplates are provided, the underside shall be scribed with the words "THIS SIDE DOWN" using welding rod material prior to milling the mounting pad for each equipment foot or mounting surface. Mounting surfaces and mounting pads on soleplates shall be milled flat to a tolerance of not less than 0.002 inch per foot in all directions. Soleplates shall be machined for an indexed fit to the mounted equipment or driver.

E. Mounting Blocks: Where equipment is fabricated or cast with feet or mounting surfaces that are not fastened to a common baseplate or soleplate, as in dry-pit bottom suction pumps, the equipment may be supported on individual concrete piers or equipment pads in lieu of a common baseplate or soleplate and equipment pad. In such instances, the equipment shall be supported at the feet or mounting surfaces on individual mounting blocks, which shall be leveled and grouted into place on the individual piers or equipment pads as specified in this section. Vertical volute-type pumps weighing more than 2,000 pounds shall be mounted on mounting blocks under each foot or mounting

surface for the pump. All mounting blocks shall be furnished with jackscrew threads (three locations, minimum) tapped in the mounting block for the purpose of leveling mounting blocks with jackscrews.

#### **2-4. GROUT FOR EQUIPMENT PADS**

- A. Epoxy Grout for Equipment Mounting: Unless otherwise specified, grout for setting bearing surfaces of baseplates, soleplates, and mounting blocks on equipment pads shall be Epoxy Grout for Equipment Mounting as specified in Section WM-4. Where the term epoxy grout is used in the context of details and specifications for equipment mounting it shall mean Epoxy Grout for Equipment Mounting.
- B. Cementitious Nonshrink Grout: Cementitious Nonshrink Grout, specified in Section WM-4, may be used for setting bearing surfaces of baseplates, soleplates, or mounting blocks on equipment pads where equipment drivers are 20 horsepower and smaller and the combined weight of equipment and driver is less than 1000 pounds. Where the term nonshrink grout or cementitious grout is used in the context of details and specifications for equipment mounting it shall mean Cementitious Nonshrink Grout. Training and quality control by the grout manufacturer's technical representative is not required for rigid equipment mounts installed with cementitious non-shrink grout.
- C. Epoxy Primer: Epoxy primer shall be a lead-free, chrome-free, rust-inhibitive, two-component epoxy primer specifically designed for use on metal substrates and in conjunction with epoxy grout. The epoxy primer shall be a product of the epoxy grout manufacturer.

#### **2-5. ANTI-SEIZE/ANTI-GALLING COMPOUND**

Anti-seize or anti-galling compound shall be a molybdenum disulfide and graphite combination in an aluminum complex base grease conforming to MIL-PRF-907E. Acceptable products include Jet Lube 550 by Jet Lube, Inc., E-Z Break by LA-CO, or approved equal.

#### **2-6. PRODUCT DATA.**

The following information shall be provided in accordance with the product data requirements specified in the General Conditions:

1. Equipment anchor calculations specified in paragraph 11002-2.02.
2. Results of grout strength tests, as specified in paragraph 11002-3.03 D.
3. Completed Rigid Equipment Mount Installation Inspection Checklist Forms (11002-A), as specified in paragraph 11002-3.02 B.
4. List of Contractor's equipment installation staff that has completed epoxy grout manufacturer's grout installation training specified in paragraph 11002-3.02 A.

### **PART 3 – EXECUTION**

### **3-1. GENERAL**

A. Grouting: Grouting for installation of equipment on equipment pads shall take place prior to connecting any field piping or electrical and instrumentation systems. Unless the Engineer accepts an alternate installation procedure in writing, baseplates, soleplates, and mounting blocks shall be leveled and grouted with the equipment removed. Pumps shall be installed in accordance with this section and ANSI/HI 1.4 or ANSI/HI 2.4, as appropriate for the type of pumping equipment installed.

B. Connections: Connecting piping with flexible connections and/or expansion joints shall be anchored such that the intended uses of these joints are maintained in the piping system without imposing strain on the equipment connections.

C. Where an equipment manufacturer's installation requirements include a rigid connection between the machine and connecting piping systems, the Contractor shall delete any flexible coupling (including equipment connection fittings) shown on the drawings and install the equipment in the following manner, in lieu of installing the flexible coupling:

1. The equipment pad shall be prepared as shown on the details for rigid equipment mounts
2. The baseplate, soleplate, or mounting blocks supporting the equipment shall be installed, leveled, and grouted in place as specified in this section.
3. The equipment shall be installed, aligned and doweled in place as specified in Section 11005.
4. The piping shall be installed and aligned to the equipment connections and the field piping connections without welding one of the joints for one section of pipe between the equipment connection and the field piping and all valving. All flanged joints shall be bolted up and pressure tested.
5. All piping shall be fully supported by supports designed to accept their full weight and thrust forces.
6. The final sections of piping shall be aligned with the equipment and field connections without the use of jacks, chain falls or other devices to force it into alignment.
7. The final piping joints shall be welded only after the previous steps have been completed and accepted by the Engineer.

### **3-2. EPOXY GROUT TRAINING AND QUALITY CONTROL**

A. Epoxy Grout Training: Prior to commencing rigid equipment mount installation work on equipment pads, the Contractor shall furnish the services of a grout manufacturer's technical representative to conduct a training school for the workers that will be using the epoxy grout for rigid equipment mount installations. The school shall be not less than 4 hours in length and shall cover all aspects of using the products, from mixing to application. This requirement, however, shall not be construed as relieving the Contractor of overall responsibility for this portion of the work. The epoxy grout manufacturer shall furnish a list of school attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

B. Epoxy Grout Quality Control: For equipment with drivers 20 horsepower and greater, the epoxy grout manufacturer's technical representative shall provide quality control services for epoxy grout installation in rigid equipment mounts. The epoxy grout manufacturer's technical representative shall be on site to inspect and verify that the application personnel have successfully performed surface preparation, epoxy grout application, and Quality Control Inspection in accordance with these specifications for a representative portion of the epoxy grout installation work.

Specifically, the epoxy grout manufacturer's technical representative shall perform the following services for at least one rigid equipment mount installation for each equipment type and size:

1. Inspect ambient conditions during various phases of epoxy grouting installation for conformance with the epoxy grout manufacturer's requirements.
2. Inspect the surface preparation of concrete substrates onto which epoxy grout materials are to be applied, for conformance to the specified application criteria, including but not limited to substrate profile, degree of cleanliness, and moisture.
3. Inspect the surface preparation of the metallic substrates onto which the epoxy primer is to be applied.
4. Inspect the epoxy-primed metallic substrate for coverage and adhesion.
5. Inspect preparation and application of epoxy grout form work for conformance to the specifications.
6. Inspect and record that the "pot life" of epoxy grout materials is not exceeded during installation.
7. Inspect epoxy grout for cure.
8. Inspect and record that localized repairs made to grout voids are in conformance with the specification requirements.
9. Conduct a final review of completed epoxy grout installation for conformance to these specifications.

### **3-3. INSTALLATION**

A. Concrete Equipment Pad Preparation: After the concrete is fully cured, the top of the equipment pad shall be roughened by chipping the surface. Chipping shall remove all laitance and defective or weak concrete and result in a rough surface profile with a 0.25-inch minimum amplitude. Chipping shall expose broken aggregate without dislodging unbroken aggregate from the cement matrix and shall not cause fractures below the concrete surface. Leveling surfaces of the concrete that have been finished smooth and level for baseplate, soleplate, or mounting block leveling at equipment anchors shall be protected from damage during chipping. A light duty, hand held pneumatic chipper with a chisel type tool shall be used for chipping the equipment pad concrete surface. Abrasive blast, bush-hammer, jackhammers with sharp chisels, heavy chipping tools, or needle gun preparation of concrete surfaces to be grouted is not acceptable.

Prior to leveling activities, satisfactory removal of defective or weak concrete shall be demonstrated in the presence of the Engineer by operating the chipper on the chipped

concrete surface at locations identified by the Engineer. The chipped surface of the concrete shall be such that the final baseplate, soleplate, or mounting block elevation results in the grout manufacturer's recommended grout thickness between the surface of the equipment pad and the lower baseplate flange, underside of the soleplate or underside of mounting block.

All dust, dirt, chips, oil, water, and any other contaminants shall be removed and the surface protected with plastic sheeting until grout is installed.

Concrete equipment pad surfaces that have been finished smooth and level for use as leveling positions shall be protected from damage during chipping activities. Alternatively, leveling positions may be restored on chipped surfaces. Leveling positions shall be restored by installing leveling blocks or leveling plates for jackscrews on a high compressive strength epoxy putty (Philadelphia Resins, Phillybond Blue 6A, or approved equal). Leveling blocks and leveling plates shall be installed level on the epoxy putty.

B. Baseplates, Soleplates and Mounting Blocks: All surfaces of baseplates, soleplates, and mounting blocks to be in contact with epoxy grout shall be cleaned to SSPC SP-6 and shall be primed with epoxy primer within 8 hours of cleaning.

C. Leveling: All machinery shall be mounted and leveled by journeyman millwrights. Precision surveying equipment shall be used for leveling. Machinists' spirit levels will not be permitted for leveling purposes for any baseplate, soleplate, or mounting block with a plan dimension greater than 4 feet. Baseplates and mounting blocks shall be leveled to a maximum tolerance of 0.002 inch per foot or as otherwise required by the equipment manufacturer, if more stringent. Soleplates shall be leveled to 0.0005 inch per foot or as otherwise required by the equipment manufacturer, if more stringent. An anti-seize or anti-galling compound specified in paragraph 11002-2.06 shall be applied to all equipment anchor threads prior to beginning baseplate, soleplate, or mounting block leveling.

All baseplates, soleplates, and mounting blocks shall be leveled against steel surfaces (jackscrew plates, leveling blocks, leveling nuts, support plates, or other steel surfaces). Use of other materials for leveling purposes is strictly and specifically prohibited. Unless otherwise specified, baseplates, mounting blocks, and soleplates shall be leveled as indicated in the leveling details. Leveling equipment and tools shall be stainless steel leveling blocks and shims, steel wedges, or jackscrews bearing on leveling plates. Leveling nuts may be used for leveling baseplates and soleplates weighing less than 200 pounds. The use of leveling nuts for leveling mounting blocks is not permitted.

After baseplates, soleplates, or mounting blocks have been leveled on the leveling equipment, the Contractor shall clamp the baseplates, soleplates, or mounting blocks in position by installing the equipment anchor nuts and washers. Clamping torque shall be less than the final clamping torque specified in paragraph 11002-2.01, but sufficient to hold the baseplate, soleplate, or mounting block in position. The Contractor shall verify that the correct level and position of the baseplate, soleplate, or mounting block has been maintained after clamping on the leveling equipment.

Leveling blocks shall be stainless steel, four inches square and 1-1/2 inches thick with an open-ended slot terminating in the center for the equipment anchor. Leveling blocks

shall be machined flat on all horizontal surfaces and placed under the baseplate or soleplate at each equipment anchor. Shims shall be pre-cut stainless steel, slotted for removal after grouting, and shall extend not less than three inches beyond the baseplate, soleplate or mounting block. Leveling blocks and shims shall be coated with a light oil just prior to beginning the leveling and grouting work. Shims shall be placed so the tabs on the shims are easily accessible.

D. Grouting: Grout forms shall be built of minimum 0.75-inch-thick waterproof plywood and shall be securely braced (minimum brace size shall be two-by-four lumber). Forms shall be designed for a minimum of 6 inches hydrostatic head above the final elevation of the grout, to assist in flow during installation. Equipment mounting grout shall be furnished with expansion joints installed at four to six foot intervals, perpendicular to the centerline of baseplates.

Forms shall be coated with three coats of paste wax on all areas that will come in contact with the grout to prevent the grout from bonding to the forms. Forms shall be waxed before assembly to prevent accidental application of wax to surfaces where the grout is to bond. Before any forms are installed, all concrete surfaces that will contact epoxy grout shall be free from any foreign material, such as oil, sand, water, wax, grease, etc. Forms shall be liquid tight. Any open spaces or cracks in forms, or at the joint between forms and the foundation, shall be sealed off, using sealant, putty, or caulking compound. All outside vertical and horizontal edges of the grout shall have 45-degree chamfers as indicated in the equipment anchor details for rigid equipment mounts. Match chamfers in concrete portions of the equipment pad. Block outs shall be provided at all shimming and leveling positions to allow removal of leveling equipment and tools after the grout has cured. Jackscrews shall be coated with a light oil or other acceptable bond-breaking compound prior to grouting.

The 45-degree perimeter chamfer strip shall be located at the final elevation of the grout. The final elevation of the grout on baseplates with exposed I-beam or C-channel supports shall be at the top of the lower support flange. The top of the grout, on all other baseplates soleplates, and mounting blocks, shall be at least 1.0 inch above the bottom or underside of the baseplate, soleplate, or mounting block and shall not be higher than the top of the baseplate, soleplate, or mounting block. The grout's final elevation shall not be so high as to bond the equipment anchor nut and washer.

The resin and hardener for epoxy grout for equipment mounting shall be mixed in accordance with the epoxy grout manufacturer's recommendations. Epoxy grout shall be placed at the center of one end of the baseplate or soleplate and worked toward the ends in such a manner as to force the air out from beneath the baseplate or soleplate and out the vent holes, to eliminate voids. Epoxy grout shall be placed in a manner that avoids air entrapment, using a head box to pour grout into the grout holes. When the head box is moved to the next grout hole, a 6 inch high standpipe shall be placed over the grout hole and filled with grout. Use of vibrating tools and/or jarring (rapping or tapping) forms to facilitate grout flow is not permitted during placement of epoxy grout.

The Contractor shall exercise care to never allow the grout to fall below the baseplate level once the grout has made contact with the baseplate. Grout placement shall be continuous until all portions of the space beneath the baseplate, soleplate, or mounting block have been filled. Subsequent batches of grout shall be prepared so as to be ready

when the preceding batch has been placed. Under no circumstances shall the grouting operation be halted because of lack of grout mix. After the entire baseplate is full, 6 inch high standpipes shall be maintained over each grout hole, to continue purging of air. When the grout has started to take an initial set (typically this is determined by a noticeable increase in temperature and no flow of grout at the vent holes) the standpipes shall be removed and excess grout cleaned from all surfaces.

Where the cavity under a baseplate or mounting block extends above the elevation of the top of the bolting flange for the baseplate or mounting block, grouting may be completed in two pours. Under these circumstances, the first grout pour shall be continuous until the lower face of the bolting flange for the baseplate or mounting block is submerged in grout a minimum of one inch. The second grout pour shall be completed with standpipes and air purges as specified in the previous paragraph.

Grout forms shall be checked for leaks throughout grout pours. Leaks shall be repaired immediately to prevent formation of voids. A final check of baseplate, soleplate, or mounting block level and elevation shall be performed before the grout sets.

A grout sample shall be taken for each equipment pad that has a baseplate, soleplate, or mounting block set in grout. The sample shall be placed in a cylinder of sufficient size to yield three two-inch cubes as test samples. The samples shall be tagged with project name, date, time, the equipment number and ambient temperature at the time of placement. Once the epoxy grout cylinder has been completely filled, it shall be placed next to the foundation of the equipment being grouted and allowed to cure for 48 hours. After 48 hours, the test cylinder shall be tested in accordance with the grout manufacturer's recommendations by the independent testing laboratory specified in paragraph 11002-1.02 B. The results shall be reported directly to the Engineer. Forms shall be removed only after the grout has cured sufficiently and upon specific permission from the Engineer.

E. Completion: Upon acceptance by the Engineer and the equipment manufacturer's representative and after the grout has reached sufficient strength, grout forms and block outs at leveling positions shall be removed. Leveling blocks and shims or wedges and support plates shall be removed, leveling nuts and jack screws shall be backed off to allow the grout to fully support the baseplate, mounting block, or soleplate. Take care not to damage the grout during removal of extended shimming material or leveling equipment and tools.

The equipment anchor nuts shall be tightened, using calibrated indicating torque wrenches, to develop the full clamping force required by the equipment manufacturer.

Equipment anchor nuts shall be tightened in increments of not more than 25 percent of the final torque value in an alternating pattern to avoid stress concentration on the grout surface. After tightening equipment anchor nuts to final values, apply additional wax, grease, or mastic to all exposed portions of the equipment anchor beneath the baseplate, soleplate, or mounting block.

After applying additional wax or mastic to exposed portions of equipment anchors, block outs (pockets) for access to leveling nuts, leveling blocks and shims, or wedges shall be filled with the grout material installed under baseplates, soleplates, or mounting blocks

and pointed after the equipment anchor nuts have been tightened to final values. Jackscrews shall be removed and holes in the baseplate, soleplate, or mounting blocks filled with a flexible sealant (silicone rubber) or a short cap screw.

Check for baseplate, soleplate, or mounting block movement (soft foot) by individually loosening and re-tightening each equipment anchor. Vertical movement at each equipment anchor shall be measured and recorded during loosening and retightening and shall not exceed 20 micrometers (0.001 inch). Vertical movement shall be measured using a magnetic-based dial indicator on the baseplate, soleplate, or mounting block referenced to the epoxy grout surface of the equipment pad or other approved method. Soft foot conditions shall be sufficient cause for removal and reinstallation of grout and baseplates, soleplates, or mounting blocks.

Check for grout voids by tapping along the upper surfaces of the baseplate, soleplate, or mounting block. Grout voids shall be sufficient cause for removal and reinstallation of grout and baseplates, soleplates, or mounting blocks. Grout voids shall be marked. At the discretion of the Engineer, grout voids may be repaired as specified in Chapter 5, Section 3.16 of API 686.

#### **3-4. FINAL INSPECTION**

The Engineer will conduct a final inspection with the Contractor for conformance to requirements of the contract documents.

**END OF SECTION**

**SECTION 11005**

**MACHINE ALIGNMENT**

**PART 1 – GENERAL**

**1-1. DESCRIPTION**

A. This section specifies requirements for alignment of directly coupled mechanical equipment weighing 1000 pounds or more and/or greater than 100 horsepower furnished or modified under this contract. Equipment direct coupled to the motor with drivers 100 horsepower and less and belt or chain driven machinery are specifically exempted from the requirements of this section.

**1-2. QUALITY ASSURANCE**

A. General: All equipment shall be aligned using laser alignment equipment to the tolerances specified by the subject equipment manufacturer or the criteria specified in this section, whichever is more stringent.

B. Alignment Criteria: Unless otherwise specified by more stringent manufacturers' requirements, all mechanical equipment affected by this section shall be aligned to the following criteria:

Maximum Tolerable Misalignment			
Speed, rpm, maximum	Short Couplings (Distance between flex planes ≤ 4")		Spacer Shafts angle at each flex plane in mils/inch or projected offset in mils/inch of spacer length
	Offset (mils)	Angularity (mils/inch)	
600 and less	5.0	1.0	1.8
900	3.0	0.7	1.2
1,200	2.5	0.5	0.9
1,800	2.0	0.3	0.6
3,600	1.0	0.2	0.3
7,200	0.5	0.1	0.15

C. Notes: (1) Soft foot (machine frame distortion) shall be not more than 2.0 mils for any speed.

D. (2) Separately mounted equipment connected by offset universal joints are exempted from the offset and angularity requirements, but all units must be installed and leveled as specified in this section.

E. Alignment Equipment: Alignment equipment used to perform the work required under this section shall employ laser alignment techniques to achieve the required

tolerances. The equipment shall be computer based and its software shall be compatible with current Windows® based spreadsheets and databases. The equipment shall employ a hand-held field computer using a graphic interface to determine actual alignment and necessary corrective action to bring equipment into required tolerance. The link between field measurement components and the computer shall be through cable, infrared, or wireless transmission.

**1-3. REFERENCES**

This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
Shaft Alignment Handbook	Shaft Alignment Handbook, Third edition, John Piotrowski, Marcel Dekker Inc.

**PART 2 - PRODUCTS**

**2-1. EQUIPMENT**

Laser alignment equipment shall be Rotalign® Ultra as distributed by Ludeca, Inc., of Doral, Florida, or approved equal.

**2-2. ITEMS TO BE FURNISHED TO OWNER**

The following shall be furnished to the Owner upon completion of all alignment work for the project or appropriate portion thereof and prior to substantial completion of the project or portion thereof:

All alignment records, in both hard copy and in computer memory. The hard copy shall be signed and dated by the technician performing the alignment work and shall be witnessed by the Engineer.

## **PART 3—EXECUTION**

### **3-1. GENERAL**

After machine base grouting as specified under Section 11002, all machines mounted on base plates or soleplates specified above shall be aligned as specified under this section.

Alignment work shall be performed by journeyman millwrights skilled in this type of work under the supervision of a technician trained in the use of the laser alignment by the manufacturer or vendor of the alignment equipment. The use of untrained laborers, carpenters or apprentices for this work will not be acceptable.

### **3-2. PROCEDURE**

A. Sequence: Machines supported on integral feet or support pads shall be leveled, grouted and aligned in the following order: driven machine; intermediate bearings or machines; and driver. Under certain circumstances, such as a diesel engine driving a generator, it may be preferable to reverse this order and set the driver first. The Contractor shall submit a written request for a reversal of the alignment order to the Engineer and the Engineer must approve any change in alignment order in writing before it will be allowed.

B. Alignment: All machines shall be rough aligned without any connections to piping, electrical and instrumentation systems. Upon completion of all field connections, alignment shall be rechecked to demonstrate no change. If change has occurred, the Contractor shall eliminate any external forces affecting machine alignment.

C. Next, soft foot (machine frame distortion) shall be measured and brought to within the permissible tolerances (see paragraph 1.02 B, Note 1). Thereafter, the alignment shall be rechecked and the alignment process repeated if necessary to bring all machinery to final alignment tolerances.

### **3-3. VERIFICATION**

A. Factory Personnel: Where required by other sections in this project manual, factory authorized installation technicians representing the equipment manufacturer shall witness final alignment work. After completion of all alignment work, acceptance of the work shall be documented in writing by factory installation technicians.

B. Verification: All alignment work shall be independently checked using the shaft and coupling spool method described in the Shaft Alignment Handbook. All final results of the alignment work shall be subject to inspection and verification by the Engineer.

**END OF SECTION**

## **SECTION 11283**

### **SLIDE GATES**

#### **PART 1- GENERAL**

##### **1-1. DESCRIPTION**

This section specifies the supply, materials, equipment, and incidentals required to install and place into operation the slide gate as shown on the Drawings and as specified herein.

A. The CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to install, ready for operation and field test stainless steel slide gates and appurtenances as shown on the Contract Drawings and as specified herein.

B. The gates and appurtenances shall be supplied in accordance with the latest edition of AWWA C561 Standard for Fabricated Stainless Steel Slide Gates as modified herein. The allowable leakage rate for the stainless steel gates in this specification shall be 1/2 the allowable leakage listed in the latest revision of AWWA C561.

##### **1-2. SUBMITTALS**

A. Provide the following information to confirm compliance with the specification in addition to the submittal requirements specified in SP-72.

1. Complete description of all materials including the material thickness of all structural components of the frame and slide.
2. Installation drawings showing all details of construction, details required for installation, dimensions and anchor bolt locations.
3. Maximum bending stress and deflection of the slide under the maximum design head.
4. The location of the company headquarters and the location of the principle manufacturing facility. Provide the name of the company that manufactures the equipment if the supplier utilizes an outside source.

##### **1-3. QUALITY ASSURANCE**

A. Qualifications

All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 10 years' experience designing and manufacturing water control gates. The manufacturer shall have manufactured water control gates for a minimum of 100 projects. The specification is based on the Stainless Steel Slide Gate as manufactured by Rodney Hunt, Inc. or equal.

## **PART 2 - PRODUCTS**

### **2-1. GENERAL**

A. Gates shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.

B. Leakage shall not exceed 0.05 gpm/ft of wetted seal perimeter in seating head and unseating head conditions.

C. The gate shall utilize self-adjusting seals. Due to the difficulty of accessing gates when they are in service, gates that utilize adjustable wedges, wedging devices or pressure pads are not acceptable.

D. All structural components of the frame and slide shall be fabricated of stainless steel having a minimum thickness of 1/4-inch and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.

E. All welds shall be full and continuous performed by welders with AWS certification.

F. Finish: Mill finish on stainless steel. Welds shall be sandblasted to remove weld burn and scale/ pitted & passivated. All iron and steel components shall be properly prepared and shop coated with a primer.

### **2-2. FRAME**

A. The frame assembly, including the guide members, invert member and yoke members, shall be constructed of stainless steel plate with a minimum thickness of 1/4-inch.

1. Frame design shall allow for embedded mounting, mounting directly to a wall with stainless steel anchor bolts and grout or mounting to a wall thimble with stainless steel mounting studs and a mastic gasket material. Mounting style shall be as shown on the Contract Drawings.

2. All wall mounted or wall thimble mounted gates shall have a flange frame. Flat

frame gates are not acceptable.

3. Gussets shall be provided as necessary to support the guide members in an unseating head condition.
4. The frame shall extend to accommodate the entire height of the slide when the slide is in the fully opened position on upward opening gates or downward opening weir gates.
5. On self-contained gates, a yoke shall be provided across the top of the frame. The yoke shall be formed by a structural members affixed to the top of the side frame members to provide a one-piece rigid assembly. The yoke shall be designed to allow removal of the slide.
6. A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flushbottom type on upward opening gates.
7. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.
8. A rigid stainless steel member shall be provided across the invert of the opening on downward opening weir gates.

### **2-3. SLIDE**

A. The slide and reinforcing stiffeners shall be constructed of stainless steel plate. All structural components shall have a minimum thickness of 1/4-inch

1. The slide shall not deflect more than  $1/360$  of the span or  $1/16$  inch, whichever is smaller, under the maximum design head.
2. Reinforcing stiffeners shall be continuously welded (stitch welding will not be acceptable) to the slide and mounted horizontally. Vertical stiffeners shall be continuously welded on the outside of the horizontal stiffeners for additional reinforcement.
3. The stem connector shall be constructed of two angles or plates. The stem connector shall be continuously welded to the slide. A minimum of two bolts shall connect the stem to the stem connector.

### **2-4. SEALS**

A. All gates shall be provided with a self-adjusting seal system to restrict leakage in

accordance with the requirements listed in this specification.

1. All gates shall be equipped with UHMW polyethylene seat/seals to restrict leakage and to prevent metal to metal contact between the frame and slide.
2. The seat/seals shall extend to accommodate the 1-1/2 x the height of the slide when the slide is in the fully closed or fully opened position.
3. All upward opening gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member or the bottom of the slide and it shall be held in place with stainless steel attachment hardware.
4. All downward opening weir gates shall be provided with UHMW polyethylene seat/seals across the invert member.
5. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.
6. All seals must be bolted or otherwise mechanically fastened to the frame or slide.
7. The seals shall be mounted so as not to obstruct the water way opening.
8. Gates that utilize rubber "J" seals or "P" seals are not acceptable.
9. The seal system shall have been factory tested to confirm negligible wear (less than 0.01") and proper sealing. The factory testing shall consist of an accelerated wear test comprised of a minimum of 25,000 open-close cycles using a well-agitated sand/water mixture to simulate fluidized grit.

## **2-5. STEM**

A. A threaded operating stem shall be utilized to connect the operating mechanism to the slide.

B. On rising stem gates, the threaded portion shall engage the operating nut in the manual operator or motor actuator. On non-rising stem gates; the threaded portion shall engage the nut on the slide.

1. The threaded portion of the stem shall have a minimum outside diameter of 1-1/2 inches. Stem extension pipes are not acceptable.
2. The stem shall be constructed of solid stainless steel bar for the entire length, the metal having a tensile strength of not less than 90,000 psi for stems that are 3 inches or

less in diameter. Stems that are in excess of 3 inches in diameter shall have a tensile strength of 85,000 psi.

3. The stem shall be threaded to allow full travel of the slide unless the travel distance is otherwise shown on the Contract Drawings.

4. Maximum L/R ratio for the unsupported part of the stem shall not exceed 200.

5. In compression, the stem shall be designed for a critical buckling load caused by a 40 lb effort on the crank or handwheel with a safety factor of 2, using the Euler column formula.

6. The stem shall be designed to withstand the tension load caused by the application of a 40 lb effort on the crank or handwheel without exceeding 1/5 of the ultimate tensile strength of the stem material.

7. The threaded portion of the stem shall have threads of Acme type with a 16 microinch finish or better.

8. Stems of more than one section shall be joined by stainless steel or bronze couplings. The coupling shall be threaded and bolted to the stems.

9. Stems shall be provided with adjustable stop collars to prevent over closing of the slide.

## **2-6. STEM GUIDES**

A. Stem guide shall be provided when necessary to ensure that the maximum L/R ratio for the unsupported part of the stem is 200 or less.

1. Stem guide brackets shall be fabricated of stainless steel and shall be outfitted with UHMW or bronze bushings.

2. Adjustable in two directions.

## **2-7. WALL THIMBLES**

A. Wall thimbles shall be provided when shown on the Contract Drawings.

1. The wall thimble depth shall be equal to the thickness of the concrete wall in which the thimble is to be mounted.

2. Wall thimbles shall be fabricated stainless steel construction of adequate section to withstand all operational and reasonable installation stresses.

3. Wall thimbles shall be constructed of 1/4-inch minimum thickness stainless

steel and the front face shall have a minimum thickness of 1/4-inch.

4. The fabrication process shall ensure that the wall thimble is square and plumb and the front face is sufficiently flat to provide a proper mounting surface for the gate frame.

5. The face of the wall thimble shall only be machined if recommended by the gate manufacturer. If the wall thimble is to be machined, the front face shall have a minimum thickness of 1/4-inch after machining.

6. A water stop shall be welded around the periphery of the thimble. Wall thimbles shall be designed to allow thorough and uniform concrete placement during installation.

7. Studs and nuts shall be stainless steel. Water stop may be stitch welded.

8. A suitable gasket or mastic shall be provided to seal between the gate frame and the wall thimble.

## 2-8. MATERIAL OF CONSTRUCTION

Frame Assembly and Retainers:	Stainless Steel, Type 316, ASTM A240 Slide and Stiffeners:	Stainless Steel, Type 316, ASTM A240
Stem:		Stainless Steel, Type 316, ASTM A276
Fasteners, Nuts and Bolts:		Stainless Steel, Type 316, ASTM A276 Invert Seal (Upward Opening Gates Only): Neoprene ASTM D-2000 or EPDM
Seat/Seals and Facing: ASTM D4020		Ultra-High Molecular Weight Polyethylene
Lift Nuts:		Bronze ASTM B584
Pedestals and Wall Brackets:		Stainless Steel, Type 316L, ASTM A276 Operator Housing: Cast aluminum or ductile iron

## 2-9. MANUAL ACTUATORS

A. See Section 84 - Valve and Gate Operators.

## 2-11. ELECTRIC MOTOR ACTUATORS

A. See Section 84 - Valve and Gate Operators.

## 2-12. ANCHOR BOLTS

A. Anchor bolts shall be provided by the gate manufacturer for mounting the gates and appurtenances.

1. Quantity and location shall be determined by the gate manufacturer.
2. If epoxy type anchor bolts are provided, the gate manufacturer shall provide the studs and nuts.
3. Anchor bolts shall have a minimum diameter of 1/2-inch

### **PART 3-EXECUTIONS**

#### **3-1. INSTALLATION**

A. Installation of the gates and appurtenances shall be done in a workmanlike manner. It shall be the responsibility of the CONTRACTOR to handle, store and install the equipment specified in this Section in strict accordance with the manufacturer's recommendations.

B. The CONTRACTOR shall review the installation drawings and installation instruction prior to installing the gates.

C. The gate assemblies shall be installed in a true vertical plane, square and plumb.

D. The CONTRACTOR shall fill the void in between the gate frame and the wall with non-shrink grout as shown on the installation drawing and in accordance with the manufacturer's recommendations.

E. The CONTRACTOR shall add a mastic gasket between the gate frame and wall thimble (when applicable) in accordance with the manufacturer's recommendations.

#### **3-2. FIELD TESTING**

A. After installation, all gates shall be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section. Each gate shall be cycled to confirm that they operate without binding, scraping, or distorting. The effort to open and close manual operators shall be measured, and shall not exceed the maximum operating effort specified above. Electric motor actuators shall function smoothly and without interruption. Each gate shall be water tested by the CONTRACTOR, at the discretion of the ENGINEER and OWNER, to confirm that leakage does not exceed the specified allowable leakage.

**END OF SECTION**

## SECTION 11320

### MULTIRAKE COARSE SCREEN AND WASHER/COMPACTOR SYSTEM

#### **PART 1- GENERAL**

##### **1-1. DESCRIPTION**

This section specifies the supply, materials, equipment and incidentals required to install and place into operation the MultiRake coarse screening system and washing compactor system as shown on the Drawings and as specified herein.

##### **1-2. REFERENCE STANDARDS**

The properties of all materials, design, fabrication and performance of the equipment to be furnished under this section shall be in accordance with the latest issue of applicable standard specifications. The governing authorities of these standards are listed below.

- A. AISC, American Institute of Steel Construction
- B. AISI American Iron and Steel Institute
- C. ANSI, American National Standards Institute
- D. ASCE, American Society of Civil Engineers
- E. ASME, American Society of Mechanical Engineers
- F. ASTM, American Society of Testing and Materials
- G. AWS, American Welding Society
- H. IBC, International Building Code
- I. IEC, International Electric Code
- J. IEEE, Institute of Electrical and Electronics Engineers
- K. NEC, National Electrical Code
- L. NEMA, National Electrical Manufacturers Association
- M. Underwriters Laboratory (UL and cUL)

##### **1-3. SUBMITTALS**

Submittals shall be provided to the engineer that includes all the following information:

- A. Compliance Statement: With each submittal, include a Compliance Statement listing each Specification Section and Part 1, 2, and 3 Sub-Sections, stating paragraph-paragraph, compliance with the Specifications, each minor nonconformity that is within the intent of the Specification and proposed nonconformities. Provide short descriptions of minor nonconformities, and detailed explanation and drawings of other nonconformities.
- B. Certified shop drawings showing all important details of construction, dimensions and anchor bolt locations.
- C. Descriptive product literature.
- D. Schematic electrical wiring diagram and electrical controls information.

- E. Complete motor and drive data.
- F. The total weight of the equipment.
- G. A complete bill of materials of all equipment.
- H. A valid certificate of registration naming manufacturer, and supplier if equipment is relabeled, as ISO 9001:2015 certified.

**1-4. QUALIFICATIONS**

- A. All the equipment specified under this Section shall be supplied by a single manufacturer whose Quality Management System is ISO 9001:2015 certified and applicable to the manufacture of water and wastewater treatment equipment.
- B. Qualified manufacturers shall have a minimum of ten (10) years' experience with wastewater screening and screening handling systems for consideration.
- C. If equipment is not manufactured by supplier, including welding and machining, the name and contact information of manufacturing facility must be supplied. If more than one manufacturer is used, all companies and facilities must be provided.
- D. If patents protecting equipment are not owned by supplier, then an affidavit must be supplied stating owner of design and expiration of licensing agreement.

**1-5. DESIGN REQUIREMENTS**

A. System Description

- 1. The screen will collect and remove solids from a liquid stream in a channel by means of cleaning a stationary bar rack with multiple raking mechanisms. The multiple rakes shall engage the upstream side of the bar rack from the bottom of the channel and clean the face of the rack while elevating collected solids for removal and disposal above the top of the channel.
- 2. The screen herein specified will be of the straight through multi-rake bar screen type consisting of: bar rack, dead plate, frame/supports/guides, discharge chute, drive, unloading, and chain and rake assemblies combined as a single mechanism for easy installation and proper alignment.
- 3. The solids will be automatically removed at the top of the screen into a discharge chute then fed to the screening handling system.
- 4. The multiple rakes will be directly driven by drive sprockets that shall support and rotate the rake and chain assembly.
- 5. The screen will be totally enclosed and have access covers that will be lightweight and easily removable for maintenance. Maintenance, inspection, access and lubrication points shall be no higher than 60 inches above grade level. If any

points are higher than this level manufacturer shall include permanent steps, grating and railing attached to screen frame to limit operator reach to this height.

6. The Washing Compactor will sit under the discharge point of the screen.
  7. The Washing Compactor will be adequately sized to handle all the screenings that will be generated by the screen at peak flow. The system will be required to wash the screenings to reduce the organic content and compact the remaining solids into a dry plug.
  8. The Washing Compactor will generally comprise of a screw auger rotating within the washing and drainage trough, a wash water system, a compaction zone and an outlet chute arrangement.
  9. All stainless steel (including frame, grid, and drive components) mentioned below as stainless steel shall be T316 stainless steel. All hardware shall be T316 stainless steel.
- B. System Performance - The screening system will be designed to meet the following design parameters

1. Number of screens	1
2. Peak flow per screen	30.0 MGD
3. Average flow to screen	12.0 MGD
4. Maximum Velocity through the grid	11.53 ft/s
5. Screen grid opening	1 inch (25 mm)
6. Maximum Head loss at peak flow	23.43 inches @ 30% blinding and 12 inches downstream water level
7. Minimum Rake Capacity	10,000 pounds each
8. Minimum Rake Internals	80 Inches
9. Structural design differential of frame/grid blinding	72 inches minimum @ 100% blinding
10. Drive design differential (operating)	72 inches minimum
11. Screen grid supporting drive sprockets	3 minimum – all stainless steel
12. Channel width	48 inches
13. Channel depth	102 inches
14. Screen discharge height above top channel	44.4 inches
15. Number of Washing Compactors	1
16. Diameter of screw	12 inches
17. Minimum diameter of shaft	3.5 inches
18. Compactor discharge height above grade	48 inches
19. System wash water requirements	10 GPM @ 40 PSI
20. Angle of Inclination from Horizontal	90°

## **PART 2-PRODUCTS**

### **2-1. MANUFACTURER**

- A. The equipment shall be the Multi Rake Screen and Washing Compactor as provided by Hydro-Dyne Engineering, Inc., Clearwater, FL or approved equal. Manufacturers proposing equipment described herein, must provide a detailed submittal package, which will consist, at a minimum, of all information and details prescribed in section 1.3, 1.4 and Part 2 of this specification.
- B. If submitted equipment requires arrangement differing from that specified, prepare and submit for review complete structural, mechanical, and electrical drawings and equipment lists showing all necessary changes and embodying all special features of equipment proposed. Any changes are at no additional compensation and the Manufacturer will be responsible for all engineering costs of redesign by the Engineer, if necessary.

## **2-2. MULTIRAKE COARSE SCREEN**

### **A. Frame Assembly**

- 1. The frame shall be manufactured from stainless steel plate having a minimum thickness of 3/16 inch. Additional engineered bends and bracing shall be designed to withstand a minimum differential head of 72” with a 1.5 safety factor based on yield strength when installed in accordance to manufacturer’s instructions. The frame side profile shall have a minimum width of 27 inches extending fully from the invert of the channel to the top of the screen assembly.
- 2. The heavy duty stainless steel static support frame shall stand at a 90 degree angle in the channel.
- 3. The screen will not be fixed within the channel to allow the entire machine, including bar rack, to pivot/lift out of the channel for repair or bypass. All routine maintenance will be achieved without removing the screen from the channel and shall be performed at grade level.
- 4. The guide link system will travel around a guide wear track that is integral to the support frame. The support frame shall include integral stainless steel wear tracks in which the guide links travel around defining the chain and rake assembly path.
- 5. The frame shall accommodate stainless steel protective covers designed to prevent leakage and contain odor. All access covers for maintenance will be lightweight and easily removable. Screens with covers requiring neoprene, rubber or plastic seals are not acceptable.
- 6. If required, the screen manufacturer will supply the stainless steel angled filler plates with neoprene seals to connect from the upstream corners of the support frame to the channel walls.

### **B. Chain and Rake Assembly**

1. The chain and rake assembly shall consist of heavy duty stainless steel links connected in parallel and separated by a thick UHMWPE guide link. The rakes shall be bolted to the stainless chain link and be easily replaceable/removable.
  2. Each stainless steel link shall be fabricated from minimum 1/4 inch stainless steel. Each guide link shall be machined from solid UHMWPE and be a minimum 2 inches thick to protect against undue wear from grit. Total yield strength per strand of chain assembly shall be a minimum 10,000 pounds.
  3. The stainless steel links will be connected by minimum 3/4 inch diameter stainless steel axles every 8 inches to form a continuous belt that will rotate within the screen frame's guide system.
  4. Chain tensioning shall be through easily accessible adjustment bolts on the drive mechanism.
  5. The rakes shall be fabricated from minimum 1/4 inch thick stainless steel. Additional engineered bends and bracing shall be designed to withstand the specified minimum rake capacity when loads are evenly distributed.
  6. Rakes should have an obtuse bend to add strength and prevent screenings from rolling back off rake into channel. Flat rakes without this feature are not permitted.
  7. The rake comb shall have the tooth profile precision cut from a continuous bar of sufficient thickness and depth to insure adequate stiffness and strength to cope with the specified duty.
- C. Tracks, Guides and Seals
1. The stainless steel chain and UHMWPE guide link assembly shall travel in a stainless steel guide track that is integral to the support frame.
  2. The design will ensure that the support frame combines with a labyrinth seal on each guide link to prevent accumulation of debris, intrusion of grit particles and damage to guide links. This seal must form an uninterrupted closure between the screen frame and the moving chain to protect the chain on the entire travel path below the maximum water level.
  3. Guide systems that use rollers, stainless or hardened/stainless steel chains on plastic wear strips will not be acceptable.
  4. Chain to frame sealing systems that use adjustable UHMWPE strips attached to the frame will not be acceptable.
  5. Screens with sprockets, bearings, bushings, guide wheels or similar rotating components below the waterline are NOT acceptable. Sealed, self-lubricating, lifetime, or maintenance free bearings are not acceptable

#### D. Screen Drive Mechanism

1. Each screen will have a maximum 0.75 hp, inverter duty electric motor suitable for a 460/3/60 supply and rated for a Class 1 Div. 2 environment. As a minimum, the motor will be TEFC with an IP55 enclosure rating and will conform to NEMA MG-1 requirements. The motor will be located outside of the screen covers and above the top of the channel.
2. The gear reducer shall be directly coupled to a heavy duty shaft machined from solid stainless steel round bar. Chain and sprocket reduction is not allowed.
3. The chain and rake assembly will be supported and rotated around heavy duty stainless steel drive sprockets located on the drive shaft in the head space of the screen. All machined and fabricated drive components shall be stainless steel. Coated steel drive shaft and drive sprockets are not acceptable.
4. The drive sprockets will have lugs that transmit torque directly from the gear reducer to notches on the underside of the UHMWPE guide links. Driving forces shall be transmitted to areas located behind the screen's seals to prevent solids from contacting, or accumulating on, driven surfaces.
5. Drive systems that use an external track and pinion to drive or push the band against grid weight supporting wear tracks will not be acceptable. Drive shall lift, and be capable of bearing, the full weight of the grid.
6. Painted or carbon steel drive shafts and sprockets are not acceptable.

#### E. Bar Rack

1. The screen shall be provided with a bar rack that serves as the filtration area separating solids from the flow. The bar rack shall consist of parallel bars manufactured from stainless steel equally spaced at the specified opening. Rectangular shaped bars shall be a minimum 1/4 inch thick by a minimum 1.5 inches deep and shall extend above the highest expected water level.
2. The parallel bars shall be connected at the top and bottom of the bar rack and shall be capable of individual replacement in the field. Design shall allow for changing of bar spacing in the field if required.
3. The bottom of the bars shall be attached to a screen base plate that rests flush with the invert of the channel.
4. The bottom of the bar rack shall be provided with a curved plate, which allows the raking mechanism to engage the bottom portion of the bar rack.

#### F. Dead Plate and Discharge Chute

1. The screen shall include a fixed dead plate extending from the top of the bar rack to the discharge point. Designs that do not extend completely to the discharge point are not acceptable.
2. Dead plate shall be fabricated from 3/16 inch thick stainless steel.
3. The flat plate shall be securely attached to the screen frames. Proper support shall be provided to ensure that rake teeth will have a close clearance to the dead plate and this must be maintained throughout the cleaning cycle.
4. A discharge chute shall be attached to the top of the dead plate at the specified height for directing collected debris for removal.
5. The discharge chute shall be manufactured with 14 gauge stainless steel and include an access door for inspection and replacement of wiper on unloading assembly.

#### G. Unloading Assembly

1. Accumulated solids and debris collected by the rakes are lifted to the top of the dead plate where the discharge chute begins. These solids will fall off the rakes for disposal. An unloading assembly consisting of a pivoting stainless steel mechanism with a replaceable UHMWPE wiper blade shall clean rakes of solids that do not unload by gravity above the top of the discharge chute eliminating carryover.
2. The wiper shall contact each rake at its inner surface as the chain assembly lifts it up towards the drive mechanism. The wipers shall scrape any solids remaining on the rakes and automatically reset for the next rake. The wiper shall allow the chain and rake assembly to operate in reverse without the need to manually lift or reset the unloading mechanism.
3. The entire wiper assembly shall be contained within the frameworks of the screen, covers and discharge chute.
4. The unloading assembly shall be designed to reset to the home position without the requirement of any shock absorption to prevent mechanism from jarring into place.

#### **2-3. THE WASHING COMPACTOR**

- A. The main body will be the washing trough that will receive screenings directly from the discharge point of the screen.
- B. The washing trough will house the screw auger and provide a dedicated section to reduce organic content.

- C. The stainless steel drainage section will be slots with 5mm openings. This drainage section shall be removable and easily replaceable in the field with no special tools. The flights of the screw will be fitted with a stiff nylon brush that will maintain contact with the drainage section, preventing blockages. The replaceable brushes will be supplied in pre-coiled lengths with stainless steel removable clamps.
- D. The underside of the washing trough will be a catch pan chute that will divert the water that passes through the drainage section, back to the influent flow with dual outlet plain end pipe connections. The unconnected pipe side will be capped with a rubber compression cap so that it can be removed and the drain piping can be cleaned if necessary. The catch pan will include a flushing connection point for washing and cleaning.
- E. The catch pan will include a separate wash water supply to periodically purge the area of accumulated solids. The manufacturer will supply a 1/2" minimum solenoid valve connected to a single spray nozzle that will direct water across the length of the pan toward the outlet. The frequency of cleansing cycles will be controlled through the main control panel.
- F. The stainless steel screw auger will sit in the washing trough. Washing compactors with shaftless screws are not acceptable as a shaft is required to support the flight and provide necessary torque and compaction. Carbon steel screws are unacceptable due to corrosion probability.
- G. The auger will be a varied pitch screw supported at the compaction end by hardened steel wear and anti-rotation bars designed to prevent the compacted screening from spinning within the compaction zone.
- H. The screw will rotate allowing wash water and free organic/fecal material finer than trough openings to escape and return to the plant flow. The wash water system will flush the separated organic material through the drainage section in solution or as small particles.
- I. The compacted screenings will be pushed through the compaction zone and pass through an elbow into an outlet chute. The outlet chute will be tapered at 1 degree to allow for screening expansion and will elevate the dewatered screenings to discharge into a bagging system.
- J. The outlet chute will terminate in a flange that will connect directly to a stainless steel discharge long radius elbow that will direct the compacted screenings downward into the screenings collection bag. The elbow will be designed to prevent bridging of solids and will be flanged for accessibility.
- K. The outlet of the discharge elbow will be a stainless steel mounting assembly that will allow a 24" diameter circular screenings collection bag to slide into position.
- L. The screenings collection bag will house one 230 feet long continuous bag that will be released under the weight of compacted screenings dropping from the outlet chute.

- M. The plastic bag shall be capable of cutting and tying off into operator determined sizes to effectively capture odor and all remaining water in screenings.
- N. The washing compactor shall be mounted on four rolling casters constructed from T304 stainless steel and high density plastic for the wheels.
  - 1. All four casters shall swivel with two having brakes.
  - 2. Casters shall be minimum 4 inches in diameter.
  - 3. Each caster must be rated to hold a minimum of 800 lbs.
- O. Each Washing Compactor will have a minimum 3 hp, inverter duty electric motor suitable for a 460/3/60 supply and rated for a Class 1 Div. 2 environment. As a minimum, the motor will be TEFC with an IP55 enclosure rating and will conform to NEMA MG-1 requirements.

**2-4. SPARE PARTS** - The manufacturer will supply the following spare parts, per screen supplied, with the equipment:

- A. One (1) UHMWPE wiper blade
- B. Two (2) stainless steel chain links
- C. Two (2) UHMWPE guide links
- D. One (1) rake comb
- E. Five (5) screenings collection continuous bags

**2-5. ACCESSORIES** - The manufacturer will supply the following accessories, with the equipment:

- A. One (1) 1” NEMA 7 brass body solenoid valve
- B. One (1) 1.5” wash water strainer

**2.6. ELECTRICAL CONTROLS AND ANCILLARY COMPONENTS**

- A. General Information - The manufacturer will supply one UL listed main control panel and one local control station that shall automatically control the equipment offered in this section.
- B. The Main Control Panel – NEMA 4X stainless steel for outdoor installation – Control panel shall consist of the following components for each screening system:
  - 1. Main lockout/fused disconnect switch
  - 2. Variable Frequency screen drive
  - 3. Compactor motor starter
  - 4. Control transformer, 500 VA minimum
  - 5. Programmable control relay with minimum 5 cycle timers
  - 6. Fused disconnect
  - 7. Hour run meter
  - 8. Fuses and breakers

9. Motor overload sensor
10. Panel power light
11. Screen run/fault lights
12. Washing Compactor run/fault lights
13. Reset pushbutton
14. Current monitors

C. Ancillary Control Components -

1. Ultrasonic differential level system consisting of the following per screen:
  - a. NEMA 4X enclosure with viewing window
  - b. Milltronics Hydro-Ranger 200 controller with real-time 4-20mA output
  - c. Two (2) NEMA 4X/7 transducers
2. Local Control Station– NEMA 7 - Each local control station shall consist of the following components:
  - a. NEMA 4X, 7BCD (Corrosion resistant, outdoor, explosion proof)
  - b. Hand/Off/Auto switch for each motor
  - c. Forward/ Off/ Reverse switch with return to Off
  - d. Emergency stop
3. Dry relay contracts for Customer's use:
  - a. Bar Screen Control Power OK
  - b. High Upstream Level Warning
  - c. High-High Upstream Level Alarm
  - d. High-High Level Upstream Float Switch Alarm (two (2) individual contacts required)
  - e. Bar Screen Running
  - f. Bar Screen Fault Alarm
  - g. Compactor Running
  - h. Compactor Fault Alarm
  - i. Compactor Low Load Alarm
  - j. Compactor High Load Alarm
  - k. High Differential Level Warning
  - l. High-High Differential Level Alarm (two (2) individual conacts required)
  - m. Common Wash Valve Fault Alarm

D. Sequence of Operation

1. The screen shall be manually and automatically operated through the supplied control panels and can interface with additional plant controls. While in operation, the drive mechanism will rotate the chain and rake assembly around the screen frame and tracks. The screen can be called to reverse manually or automatically and can change speeds based on upstream level or differential level. Overload protection shall be provided through current monitoring in the event of blockage or jamming. The use of clutches, friction disks or similar mechanical devices for overload protection is not acceptable.
2. Jam control logic shall be included through a smart relay to provide overload protection in the event of a screen blockage stalling the raking mechanism. If a

blockage were encountered in the hand operation, the controls would stop the raking mechanism and an alarm signal will be generated. If a blockage were encountered in the automatic operation, the controls would stop the raking mechanism, reverse direction for a predetermined time to dislodge the blockage with the preceding rake, and then return to the normal raking direction. Once the blockage is dislodged, the operating sequence continues as normal. If any single blockage is not dislodged after three (3) reversals (operator adjustable), the screen will stop operation and an alarm signal will be generated.

3. Each screen shall be supplied with an individual variable frequency drive (VFD) appropriately sized for the motor and operational requirements as determined by the manufacturer. The VFDs shall include discrete and/or analog inputs and outputs as required to adjust the rake speed based on level and/or differential level. Rake speed shall increase, decrease or stop in relation to adjustable level settings for optimization of screen operation. If a call to run is not initiated by level settings then the screen will operate at a low speed based on an adjustable exercise timer.
4. The Washing Compactor shall receive a call to run while screen is in operation. The continual washing, compaction and conveyance sequence will continue while screen is in operation in either Hand or Auto when the compactor is in Auto.

## **2.7. SURFACE PREPARATION AND PAINTING**

- A. Applicable stainless steel materials, including hardware, flanges and piping shall be pickled by means of a four tank system that is in accordance with ASTMs A380 and A967. This process is for quality control, removal of heat affected discoloration, surface treatment for corrosive environments and to provide a uniform finish to the stainless steel surfaces. Stainless steel components must be fully submerged in the tanks for complete coverage. Electro-chemical wanding is acceptable on weld finishes that cannot be submerged due to size. Sandblasting, pickling pastes and abrasive cleaners will not be accepted as forms of metal finishing.

Tank 1 – Detergent bath for the removal of soils, greases, oils and dirt

Tank 2 – Rinsing process to remove detergent and residual soils

Tank 3 – Two part acid solution for the removal of tightly adhere oxide films

Tank 4 – Final rinse process to remove all residual acid

- B. All ferrous surfaces (except stainless steel) shall be coated with a pre-primer, primer, and an exterior top coating, or fusion bonded polyester coating suitable for humid/wet environments for superior corrosion protection.
- C. Motors and gearboxes shall be surface prepared to withstand humid/wet environments for superior corrosion protection.

## **PART 3 EXECUTION**

### **3-1. WARRANTY –**

- A. The Manufacturer of the equipment supplied under this specification shall provide a warranty for a period of twelve months commencing on acceptance and/or beneficial occupancy by the Owner but no later than 90 days from the date of shipment by the Manufacturer. The Manufacturer shall guarantee that the equipment furnished is suitable for the purpose intended and free from defects in design, materials and workmanship. In the event that the equipment fails to perform as specified the Manufacturer shall, at his option, promptly repair, modify or replace the defective equipment.

### **3.2. FACTORY TESTING**

- A. The screening system and all components shall be factory assembled and tested for a minimum of 24 hours prior to shipment. The equipment shall be shipped fully assembled and shall be capable of being set in place and field erected by the Contractor with minimal field assembly.
- B. During the factory test period the screening system shall be adjusted as required assuring proper operation on completion of the field installation. The Manufacturer shall supply a certification of the completion of the factory testing of the assembled screening system and appurtenances and shall certify as to the equipment being in satisfactory operating condition at time of shipment. The Engineer and/or Owner may, at their own option and expense, witness the factory test.

### **3.3. DELIVERY AND STORAGE**

- A. The screening system shall be appropriately crated and delivered to protect against damage during shipment.
- B. An authorized representative of the Contractor shall inspect the screens on delivery to the jobsite and shall report any damage or missing components to the Manufacturer and the Engineer within 72 hours of receipt of the shipment.

### **3.4. INSTALLATION**

- A. The installation of the equipment shall be as indicated on the drawings and in strict accordance with the Manufacturer's instructions and recommendations. The manufacturer shall provide an installation certificate.

### **3.5. FIELD TESTS, ADJUSTMENTS AND COMMISSIONING**

- A. The equipment shall be shipped completely factory assembled. Contractor shall verify all access dimensions, channel dimensions, and any interior building dimensions to ensure equipment may be installed as a factory assembled units.
- B. After completion of the installation, the equipment shall be inspected and certified by an authorized representative of the Manufacturer as being in compliance with the Manufacturer's recommendations and requirements. At such time as the

Manufacturer has deemed the installation to be acceptable, the Manufacturer's authorized service representative shall make any required adjustments and shall start the equipment to assure proper operation.

- C. The Manufacturer's authorized representative shall provide instruction to the plant personnel as to the operation and maintenance of the equipment including commissioning, shut down, on-line operations, lubrication and preventative maintenance.
- D. Manufacturer shall state field service rates for a Service Engineer to Owner and Contractor. In the event that the field service time required by this section should not be sufficient to properly place the equipment into operation, and the requirement for additional time is beyond the manufacturer's responsibility, additional time shall be purchased by Contractor to correct deficiencies in installation, equipment, or material without additional cost to Owner.
- E. The Contractor shall include in his bid, the cost of the above referenced authorized service representative for a minimum of one (1) trip totaling one (1) eight hour day onsite to complete the certifications and training described in this specification section.

**END OF SECTION**

**SECTION 13231**

**INFLUENT SEWER CHANNEL AND WETWELL CLEANING**

**PART 1 – GENERAL**

**1-1. SCOPE**

This section covers the removal of all liquid, scum, and accumulated (settled) solids from the influent inlet channel and associated wetwell; cleaning of walls and floors, waste disposal; and inspection for the existing channel and wetwell includes the following items of work; as indicated on the drawings.

- A. Preliminary work as necessary to provide proper access to the inlet channel and wetwell including bypass pumping of influent wastewater sewage and diversion of all influent flow.
- B. Furnishing all labor, materials, tools, plugs, chemicals, equipment or process machinery, as well as all trucks and suitable containers, supplies, personnel, odor and noise control, safety devices, and supervision, and all other requirements necessary for the complete removal and disposal of liquid, accumulated solids, rags and paper waste, grit, scum, and all other debris deposited within the channel and wetwell.
- C. The Contractor shall transport the screenings and all inorganic or organic liquid and/or solids debris removed from the sewer and wetwell from the Site to an approved disposal site. The contents of the hauling units may be checked at the disposal site for conformance with the manifest that shall accompany each load to the disposal site. Contractor shall perform all testing on the hauled material as required by the disposal site.
- D. All sewage and material removed from the influent channel and wetwell must be removed from the site daily.
- E. After removal and disposal, the Contractor shall wash all interior surfaces of the channel and dispose of wash water prior to inspection of the channel's interior walls and floor.
- F. The Contractor shall take precautions to prevent leakage or spillage onto the property, roadways, drainage system, and waterways. The Contractor shall be liable for clean-up costs or any fines that may be levied including those by regulatory agencies, against the Owner in the event that a leak or spill occurs. The Contractor shall also be responsible for reporting spills to the appropriate regulatory agencies including the Florida Department of Environmental Protection.
- G. The Contractor shall maintain a clean work site, remove debris and dispose of it properly at the Contractor's expense. Upon completion and before making application for acceptance of the Work, the Contractor shall remove all rubbish, temporary structures, and equipment, and repair all damage caused by the Contractor.

- H. The Contractor shall make all necessary repairs described on the Drawings and in the Specifications or discovered after cleaning of the surfaces prior to reinstating the channels/wetwell into service. Work includes but is not limited to removal of select portions of the PVC liner and repairs according to Section 09970. Any repair work must be authorized by the City.

## **1-2. GENERAL REQUIREMENTS**

Prior to the cleaning operation, the Contractor will provide bypass pumping of all influent wastewater sewage. As bypass pumping shall impact regular traffic in the adjacent area, the Contractor shall be responsible for maintaining traffic conditions and developing a maintenance of traffic plan.

- A. The Contractor employees working within the channel shall complete and submit the City's Confined Space Entry Form each day that personnel are entering the sewer system. All personnel entering the sewer system must complete confined space training.
- B. The Contractor shall drain and pump settled sewage from each channel and wetwell, and dispose of the screenings at an approved disposal site. Liquid waste can be diverted to the bypass pumping system for treatment at the City's wastewater treatment facility at the Contractors discretion.

## **1-3. SUBMITTALS**

The following shall be submitted in accordance with the requirements of the general requirement:

- A. Injury and Illness Prevention Program or Health and Safety Plan.
- B. Screening Operations Plan including equipment to be used and plan for mitigating odors and noise. The plan shall also include procedures to mitigate effect on plant operations.
- C. Procedures for cleaning the inlet channel including:
  - 1. Description of processes, methods, and equipment to be used, including pumps, valves, piping, screening, electrical and control systems, chemical and water systems.
  - 2. Sketch showing layout of temporary screening, and proposed route for trucks from the Site to the disposal site.
  - 3. Drawings for proposed routing of temporary piping and electrical connections, showing all the plant interface connections.
  - 4. Estimated quantity of wastewater to be processed.
  - 5. Description and location of the permitted disposal facility for screenings/debris.
  - 6. Proposed hauling schedule to disposal facility.
  - 7. Description of mitigation measures for odors, noise, and spills, and a description of housekeeping procedures for temporary screening and spill abatement and clean up.

**1-4. CONTRACTOR QUALIFICATIONS**

The Contractor shall have completed at least five similar projects within the past five years. The Contractor shall furnish (own or rent) all major equipment used in the cleaning operation, including pumps, plugs, and screenings equipment.

Personnel performing the Work shall be qualified to operate all equipment and be properly trained to comply with all OSHA safety requirements. All Contractor employees shall be certified in confined space entry and first aid. Proof of Contractor qualifications shall be submitted at the time of bidding.

**1-5. COORDINATION**

Contractor shall meet with the Owner at the beginning of the Project to coordinate the Owner’s requirements for maintaining pumping operations and decommissioning the screening facility to be cleaned before preparing the Progress Schedule. The Contractor’s schedule shall include time required by the Owner to decommission the screenings facility and to maintain operation of the Owner’s solids handling process. Decommissioning procedures and the estimated time required are outlined in the General Material and Equipment Requirements. The Contractor shall notify Owner at least 3 weeks prior to the date Contractor wants the screening facility to be taken out of service. The Owner will cooperate with the Contractor to the extent allowed by the Owner’s operations requirements, to facilitate the cleaning work.

Contractor shall exercise care to prevent damage to the existing inlet channel, chemical piping, electrical components, and prevent liner.

**1-6. SCREENING FACILITY PARAMETERS**

Influent Inlet channels

The two (2) inlet channels have the following parameters:

Width	4	Ft.
Height	7	Ft
Approximate Channel Length	25	Ft
Cover type	Open	
Approximate liquid depth	4.6	Ft

Wetwell

The two (2) wet wells have the following parameters

Width at Base	3	Ft.
Width at Top	8.0	Ft.
Height	8.5	Ft.
Cover type	Open	
Approximate liquid depth	8.0	Ft.

The information in the table above is based on operational history and existing record drawings. Approximate liquid depth is based on historical high-water elevations.

**PART 3 – EXECUTION**

**3-1. PRELIMINARY**

Contractor shall be responsible for all preliminary work and equipment necessary to provide proper access to the screening facility and influent channel/wetwell.

- A. Contractor shall furnish necessary pumps, pipes, hoses, pipe connections, valves, plugs, and related appurtenances needed to supply water to and remove the material (including the water) from each channel and wetwell. The Contractor shall provide the equipment necessary including pumps, plugs, conveyors, and other equipment which may be used to remove the contents of the inlet channel.
- B. Potable water will be used for all cleaning applications.
- C. Owner will close and lock out all isolation valves/gates on the influent and effluent side of the channel to ensure isolation of the screening facility for cleaning and repair.
- D. The atmosphere inside the screening facility may consist of gases including hydrogen sulfide. Contractor shall be responsible for furnishing and operating all air quality testing, hazard monitoring equipment, and ventilation equipment as required to provide adequate protection for workmen and to eliminate explosion and health hazards. The Contractor shall ensure that each screening facility has been purged and is free from all explosive/harmful gases before performing any work in the screening facility.
- E. Contractor shall have access to power at the facility for the cleaning work.

**3-2. GENERAL**

- A. Contractor may clean channels concurrently to maximize productivity as agreed upon by the Owner. At the pre-construction meeting, sequencing of these activities shall be discussed to coordinate the work to prevent negatively impacting plant operations, such as during wet weather flows.
- B. The Contractor shall supply all of the equipment, labor, and materials necessary to clean the channels. Channel cleaning is expected to be completed in 2 phases – Heavy Cleaning and Light Cleaning.

### **3-3. HEAVY CLEANING**

- A. The Contractor shall be responsible for removing the sand, debris, and grit material from the channels and final disposal of the material in accordance with all applicable local, state and federal regulations. The depth of sand, grit and debris is not consistent in all areas of the channel.
- B. Contractor shall remove all floating scum and material inside the channels to be cleaned as part of the work. Contractor shall remove and dispose of all rags and roping accumulated in the area to be cleaned as part of the work.

### **3-4. LIGHT CLEANING**

- A. The Contractor shall be responsible for pressure washing the channels for removal of the remaining scum, sand, debris, grit, and other material not removed during heavy cleaning. Final disposal of the material shall be in accordance with all applicable local, state and federal regulations.
- B. The Contractor shall supply all the equipment (pumps, generator, piping, appurtenances etc.) necessary to dewater the channel to perform the work. At a minimum, a 10-inch hydraulic pump will be required to adequately drain the channel. The price shall include equipment necessary to isolate the channels, associated pumps, piping and appurtenances necessary for a successful operating temporary system.
- C. The Contractor shall assume that both channels will be cleaned simultaneously as directed by the Owner. The mobilization and demobilization cost shall take this into consideration. No additional allowances will be made for delays due to rainfall events.
- D. The Contractor will be responsible for the cost of repair and/or replacement due to any damage incurred to existing structures or equipment during the cleaning activities.
- E. The Contractor shall notify the Owner of any existing damage in place prior to the demolition and document with photographs.
- F. The Contractor shall transport the collected material to an approved disposal site. The Contractor shall coordinate the disposal of the material and be responsible for finding an approved disposal site. The Contractor shall be responsible for any associated permits and fees.

- G. Contractor shall coordinate with the Owner to allow equipment inside the channels to be cleaned as part of the work to be inspected when dewatered. This includes slide gates, valves, and piping. The Contractor is responsible for supplying all equipment (pumps, piping, etc.) required to allow proper inspection of the work.

### **3-5. FLOW CONTROL**

- A. The Contractor shall be responsible for diverting the flow of sewage as needed for repair and coating. Bypass pumps, sand bagging, cofferdams, and other similar means of flow control are acceptable. All provisions for power and labor are by the Contractor at the Contractor's expense. Contractor shall present a Bypass Pumping plan to the Owner and Engineer for review
- B. The University Pumping Station can be shut down for a short period of time for channel cleaning. For safety, shut down of the University Pumping Station is required for cleaning of the channels and installation of the new automatic bar screen and slide gate. The shutdown must be scheduled with City of Tampa personnel.
- C. It is essential to the operation of the pumping station that there is no unscheduled interruption in the flow of sewage throughout the duration of the Project. To this end, Contractor shall provide, maintain and operate all temporary facilities such as dams, pumping equipment (both primary and back-up units as necessary) to intercept the sewage flow before it reaches the point where it would interfere with their work, carry it past their work and return it to the system downstream of their work.
- D. Flow control systems must be operated and maintained 24 hours per day, 7 days per week, including holidays, as required, to control flow. Discharge of sewage onto the construction site shall not be permitted. The Contractor shall be solely responsible for clean-up, repair, property damage costs and claims resulting from failure of the flow control system. Contractor shall be responsible for any violations of laws, regulations or permits and shall indemnify and hold Owner harmless for any and all damages, including but not limited to, fines and penalties that arise from such violations.

### **3-6. COATING FOR CHANNEL REPAIR**

- A. Safety: The Contractor shall perform all work in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements regarding confined space entry and respiratory protection from airborne particulate materials during cleaning and product mixing and application.
- B. Cleaning: All concrete and masonry surfaces to be coated shall be clean. All grease, oil, laitance, coatings, unsound concrete, and other foreign materials shall be completely removed. Water blasting utilizing a 210° F steam unit and proper nozzles shall be the primary method of cleaning; however, other methods such as wet or dry sandblasting, acid wash, concrete cleaners, degreasers or mechanical means may be required to properly clean the surface. All surfaces on which these other methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their

reactant products. Debris resulting from cleaning shall be removed and not allowed to be carried downstream.

- C. Patching: All large cracks, holes, voids, and spalled areas shall be patched. All cracked or disintegrated material shall be removed from the area to be patched, exposing a sound subbase. All cracks not subject to movement and greater than 1/16 inch in width shall be routed out to a minimum width and depth of 1/2 inch and patched with non-shrink patching mortar.

### **3-7. VENTILATION**

Sufficient forced ventilation shall be provided to remove sewer gas at a rate required to maintain safe working conditions. Contractor shall be responsible for furnishing and operating all ventilating equipment in a safe manner and testing air for hazardous conditions to provide adequate protection for workers inside the screening facility and to eliminate explosion hazards. All ventilating equipment operated screening facility shall be rated for operation in Class 1, Division 1, Group C and D hazardous areas.

### **3-8. COMPLIANCE WITH REGULATIONS**

Compliance with local, state, and federal regulations concerning emissions or disposal of solid, particulate, liquid, or gaseous matter as a result of the cleaning and other operations shall be the responsibility of the Contractor. Any fines imposed on the Owner or Engineer by any regulatory agency as a result of the Contractor's noncompliance with environmental regulations shall be paid or reimbursed by the Contractor.

### **3-9. INJURY AND ILLNESS PREVENTION PROGRAM (IIPP) OR HEALTH AND SAFETY PLAN**

The Work shall be performed in accordance with the Contractor's IIPP or Health and Safety Plan which shall cover all aspects of health and safety that may be encountered during the course of the Work. The plan shall be in compliance with all applicable federal, state, and local safety regulations. The plan shall include a confined space entry policy and program, plan for operations in hazardous areas, fall protection plan, identification of the Contractor's competent person, and training certificates of employees involved in the cleaning of the inlet channel including evidence of completion of confined space entry training, CPR training, and first aid training.

### **3-10. CHANNEL INSPECTION**

After the contents of the channel have been removed and surfaces have been pressure washed, the Contractor shall notify the Owner. A Sewer Inspection Plan will be developed by the Owner's construction administration engineer to determine the inspection needs and requirements based on initial visual observations. The cost of the access to inspect the inlet channel walls will be borne by the Contractor based on the inspection requirements proposed by the Owner and the Engineer. Inspection requirements may include ladders, scaffolding and/or a rope system for access to the interior walls. These costs will be paid for by the Contractor.

The inlet channel shall be inspected by Owner, Engineer, and Contractor to determine extent of the surface repair required. The Contractor shall coordinate the attendance of all involved parties, including but not limited to the Contractor's superintendent and concrete repair contractor. The Contractor's "rigging" shall provide access to all areas requested for inspection in the Sewer Inspection Plan for inspection once the inlet channel cleaning is complete. The Owner and Engineer shall be allowed use of rigging for inspection.

**3-11. SURFACE AND COATING REPAIR**

Refer to Section 09970.

**3-12. RESTORATION**

After all work is completed, Contractor shall remove and dispose of all temporary piping and facilities. A final inspection by Owner and Engineer will be performed to confirm that the any repair and restoration work has been satisfactorily completed in accordance with the Owner's requirements.

**END OF SECTION**

## **SECTION 13400**

### **GENERAL INSTRUMENTATION AND CONTROL**

#### **PART 1 GENERAL**

##### **1-1. SUMMARY**

A. Section includes requirements for furnishing and installing instrumentation and annunciator systems including all work and materials necessary to perform control and monitoring functions as illustrated on drawings, and as specified in the following sections:

1. Section 13451 – Programmable Logic Control (PLC) Systems

##### **1-2. REFERENCES**

A. Codes and Standards referred to in this Section are:

1. IEEE 802.3 10/100/1000 Mbps baseband networks
2. ISA-S5.4 Instrument Loop Diagrams.
3. NFPA 70 National Electrical Code
4. UL Underwriter's Laboratory
5. NEMA National Electrical Manufacturers Association

##### **1-3. DEFINITIONS**

A. Terminologies

1. Systems Integrator: Firms regularly engaged in providing instrumentation, Supervisory Control and Data Acquisition (SCADA) systems.
2. PLC: Programmable Logic Controller system, including power supply, central processing unit (CPU), communication controller, interconnect cables, and input and output interface.
3. OIT: Graphical local Operator Interface Terminal at PLC enclosures.
4. HMI: Operator Workstation. Touch screen based operator interface system, including hardware, operating system software, and operator interface HMI system software; generally referred to as SCADA or HMI workstation.
5. SCADA (Supervisory Control and Data Acquisition): SCADA is an integrated network of PLCs, OITs, HMIs, servers, PCs, printers and network switches. It serves as the computer based system-wide monitoring and control system.

##### **1-4. SYSTEM DESCRIPTION**

A. General Description of Work

1. Provide two (2) new 24V DC discrete input modules for installation on the existing Annunciator PLC.
2. Add additional I/O to the existing Annunciator PLC system via new conductors.
3. Modify the existing Annunciator PLC program in order to modify/control the new Bar Screen and new Slide Gate Actuator.
4. Make modifications to the existing Annunciator Maple Systems Operator Interface Terminal (OIT) for monitoring, control and alarm for the new Bar Screen and new Slide Gate Actuator.
5. The Contractor shall develop new PLC logic that will alarm the operator(s) via both SCADA and the local Annunciator when a command to open or close the Slide Gate fails to receive the respective valve open or valve closed indication via the associated valve limit switch. The Contractor shall coordinate with the slide gate manufacturer as to the required time delay required between the associated valve command request and the normal valve open or closed indication signal (amount of time required for valve travel).

B. Programming and Software Configuration

1. Provide all programming and software configuration for the new screen/compactor as part of this contract work.

C. Provide all materials and work necessary for complete and fully functional systems.

1. Provide instrumentation and control components as well as system integration. Provide all mounting hardware and supports. Work shall include panel mounting and the completion of all wiring terminations within the existing Annunciator PLC Control Panel.
2. Coordinate work with all electrical, mechanical, and structural work furnished in this contract.
3. Ensure proper interface between PLC, OIT and network systems and equipment furnished in this contract.
4. Install, make final connections, adjust, test, start-up systems per manufacturer's instructions and recommendations.

C. Design Requirements

1. General: Provide instrumentation and control system for the automatic bar screen as indicated herein and as shown on drawings.
2. Provide the new PLC System to monitor all PLC controlled systems, which include all work performed in this contract.

D. Source Code Ownership

1. Any developed ladder logic (along w/ source code) shall become property of the City of Tampa. This applies to any Annunciator graphic screen development for the OIT as well.

**1-5. SUBMITTALS**

A. General: Provide submittals as specified in the Specific Provisions and as required below. Submit documents as follows:

1. Provide cover sheet on each submittal with the following information:
  - a. Project Title, Location and Owner
  - b. Submittal Title
  - c. Submittal Order (First Submittal, Re-submittal Number, etc.)
2. Organize and divide documents, using tagged dividers, into logical divisions.
3. Provide index sheets.
4. Minimum drawing size: 8-1/2 by 11 inches. Put drawings, larger than 11 by 17 inches, in three-hole plastic pockets.
5. Type all text.
6. Do not submit faxed documents.

B. Action Submittals

1. Product Data: Submit manufacturer's official and published product data, specifications, and installation recommendations for each item.
2. Shop Drawings: Submit shop drawings as per the Specific Provisions, and as required below. Include the following information in each submittal:
  - a. Instrument index, including tag number, description, location, and calibrated range for each instrument.

- b. Individual instrument specification sheet, including manufacturer's name and complete catalog number.
  - c. PLC Input and Output drawings, containing, but not limited to, the following information:
    - (1) Instrument tag numbers
    - (2) Individual component locations
    - (3) Actual equipment wiring terminal designations, point to point wiring, and cable shield terminations
    - (4) Wire type, size and identification number
    - (5) Signal types (e.g., 120 Volt ac, 4-20 mA DC, pulse frequency, etc.)
    - (6) Contact orientations (e.g., normally open, normally closed, etc.)
    - (7) Equipment grounding requirements
    - (8) Signal boosters, interposing relays, optical isolators, and shunt resistors.
- C. Information Submittals (for owner information, not for approval)
- 1. Test Reports: Submit all loop field calibration reports.
  - 2. Manufacturer's Instructions: Submit manufacturer published installation manuals for each instrument.
- D. Contract Closeout Information Submittals (for owner information, not for approval): Provide submittals as required below.
- 1. Project Record Documents: In addition to requirements described in the Specific Provisions, provide the following:
    - a. PLC program documentation: Provide paper copies of all PLC software development and configuration including listing of all PLC register tables.
    - b. Include functional narrative description of the developed ladder logic to describe each control system. Ladder logic is to be annotated as specified in Section 13451 to include functional alphanumeric description of logic elements to assist Owner in understanding the ladder logic for troubleshooting and future modification.
    - c. PLC program copies: Provide two digital copies of fully configured PLC systems. Digital copies shall be in CD-ROM format.
    - d. Operator interface program copies: Provide hard copy printouts and digital copies of new OIT screens and database listings. Digital

Contract 18-C-00016; University Pumping Station Automatic Bar Screen  
copies shall be in CD-ROM format.

2. Operation and Maintenance Data: Provide operation and maintenance manuals as specified in the Specific Provisions. Include the following information:
  - a. Recommended spare parts list.
  - b. Manufacturer approved repair and service centers list.
  - c. Replacements part sources.
  - d. Recommended maintenance procedures and frequencies.
3. Warranty: Provide warranty certificate as described in the Specific Provisions.

## **1-6. QUALITY ASSURANCE**

### **A. Regulatory Requirements**

1. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes, applicable to construction and installation of electrical wiring, devices, material and equipment.
2. ECA Standards: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation".
3. UL Labels: Provide control panel components, power supplies, controllers, relays, etc., which have been listed and labeled by Underwriter's Laboratories.

- B.** The purpose of contract drawings and specifications is to convey information required for complete and functioning systems. Systems Integrator is responsible for all details necessary to properly install, adjust, and place in operation, intended systems. "Instrument Schedules" and "PLC I/O Summaries" are provided for convenience; their accuracy is not guaranteed.

## **1-7. DELIVERY, STORAGE, AND HANDLING**

- A.** General: Deliver, store, and handle all products and materials as specified in the Specific Provisions.
- B.** Packing and Shipping
- C.** Acceptance at Site: Inspect all materials and equipment against approved shop drawings at time of delivery. Immediately return for replacement or repair any equipment or materials damaged or not meeting requirements of approved shop drawings.

- D. Storage and Protection: Label all equipment and materials after they have been inspected. Store all equipment and materials in dry, covered, ventilated location. Protect from harm in accordance with manufacturer's recommendations.

## **1-8. PROJECT/SITE CONDITIONS**

- A. Environmental Requirements: Protect all equipment and instruments specified herein from moisture.

## **PART 2 PRODUCTS**

### **2-1. MANUFACTURERS**

- A. Allowable hardware manufacturers are listed in the respective specification sections.

### **2-2. MONITORING AND CONTROL – GENERAL**

- A. These sections contains functional descriptions of the pump station equipment and processes to be monitored by (or through) the new PLC system.
- B. Configure the PLC system to meet the functional requirements specified herein.
- C. Make all register and I/O data available to the existing Annunciator.
- D. PLC shall examine status of the input from each equipment item/group. PLC control logic and outputs shall be activated if the equipment begins to operate outside of normal limits.

### **2-3. ALARM PROCEDURES**

- A. Program the PLC and local OIT to annunciate alarms.
  - 1. When an alarm occurs, program associated PLC to function as follows:
    - a. Display alarm event in annunciator table format on the OIT.
- B. Program the PLC to permit user to acknowledge the alarm from the OIT.
- C. Schedule of new Alarms to be added:
  - 1. Bar Screen Control Power OK
  - 2. High-High Upstream Level Warning
  - 3. High-High Upstream Level Alarm
  - 4. High-High Level Float Switch Alarm
  - 5. Bar Screen Fault Alarm
  - 6. Compactor Fault Alarm
  - 7. Compactor Low Load Alarm

8. Compactor High Load Alarm
9. High-High Differential Level Warning
10. High-High Differential Level Alarm
11. Common Wash Valve Fault Alarm
12. Slide Gate Failed to Open
13. Slide Gate Failed to Close

#### **2-4. OPERATOR INTERFACE TERMINAL (OIT) SCREENS**

- A. OIT screen development : The SYSTEM INTEGRATOR shall submit 11" x 17" color shop drawings depicting the proposed screens to the City of Tampa for review. No screen development or modification will be allowed prior to the documented approval of all drawings by the City and Engineer.

### **PART 3 EXECUTION**

#### **3-1. ERECTION, INSTALLATION AND APPLICATION**

- A. General
  1. Install all instruments and equipment in strict compliance with manufacturer's instructions.
  2. Mount all gages and indicators in upright position.
  3. Provide sufficient space around equipment for maintenance and removal of equipment.
  4. Cover front panels, gages and indicators during construction for protection from dust, weld and paint splatter.
  5. Unless otherwise impractical, mount all indicating instruments at eye level (5 feet).
  6. Unless otherwise impractical, support instruments independent of process piping.
- B. Installation Hardware
  1. Provide stainless steel nuts and bolts.
  2. Provide aluminum or stainless steel support channels.
  3. Provide 1/4-inch thick minimum, clear anodized aluminum equipment mounting plates.
  4. Provide gaskets to prevent galvanic reaction between dissimilar metal surfaces.

- C. Equipment Identification and Instrument Tags
  - 1. Provide embossed stainless steel tags.
  - 2. Provide an engraved laminated plastic plate at each wall-mounted instrument panel, indicating panel and instrument function and tag.
  - 3. Engraved laminated tag colors: Provide black lettering on white background. Mount tags at eye level.

**3-2. FIELD QUALITY CONTROL**

- A. Tests and Inspection: Provide tests as required in the Specific Provisions.
- B. Inspection: Demonstrate that instruments, panels, and PLC equipment,
  - 1. Has not been damaged by transportation or installation,
  - 2. Has been properly installed,
  - 3. Has no mechanical defects,
  - 4. Has been properly connected.
- C. Tests: Perform the following tests:
  - 1. Field-calibrate all field instruments. Test all analog input loop zeroes and spans by disconnecting wiring at each transmitter and by connecting a 4-20mA generator.
  - 2. Test all external alarm contacts by placing jumpers across normally open contact inputs, or by physically disconnecting wiring on normally closed contact inputs. These procedures shall be done at location of field contacts.
  - 3. Conduct all tests in presence of Owner personnel or Engineer.
- D. Manufacturers Field Service: Provide manufacturer field service for calibration, initial setup, programming and commissioning of each instrument.

**END OF SECTION**

## SECTION 13451

### PROGRAMMABLE LOGIC CONTROL (PLC) SYSTEM

#### PART 1 GENERAL

##### 1-1. SUMMARY

- A. This section includes requirements for providing addition discrete input cards for the University Pump Station's existing Annunciator Programmable Logic Control (PLC).
- B. Programming and Software Modifications
  - 1. All programming and software modifications for the existing PLC shall be included as part of this contract work.
  - 2. All programming and software modifications for the Annunciator shall be included as part of this contract.
- C. Provide all submittal documents within 90 days of Notice to Proceed.
- D. Work includes all elements of the systems specified. Provide all control hardware complete with power supplies, enclosures, accessories, and other appurtenances. Provide installation of new equipment, and testing necessary for the proper operation of the control system.
- E. Related Sections
  - 1. Section 13400 - General Instrumentation and Control

##### 1-2. SYSTEM DESCRIPTION

- A. Design Requirements
  - 1. Make modifications to the existing Annunciator PLC Program and existing 15-inch diagonal color graphic Operator Interface Terminal (OIT) to achieve monitoring described herein Section 13400.
  - 2. Fully configure PLC system and appurtenances to form a complete working system.
- B. Make additions/modifications to the existing system, which shall include, but not be limited to input and output modules, local operator interface systems, surge protection devices and terminal blocks.
- D. Provide one copy of PLC programming software and one copy of Annunciator system programming software as specified herein. Software licensing to be for the City of Tampa. Turn all software and manuals over to City personnel

at job completion.

### **1-3. SUBMITTALS**

- A. Submit product data as required in Section 13400.
  - 1. Submit data sheets and catalog literature on each type of equipment.
  - 2. Submit programming and installation manuals for each type of equipment.
- B. Documentation:
  - 1. Provide all documentation related to PLC configuration.
  - 2. Furnish all manuals, PLC logic documentation and application programmer's notes.
  - 3. Furnish listing of PLC register tables.
  - 4. Furnish hard copy printout of all PLC logic at project closeout.
- C. Operation and Maintenance Manuals: Submit operation and maintenance manuals.

### **1-4. SPARE PARTS**

- A. Provide the following spare parts:
  - 1. Twelve (12) surge protection devices.
  - 2. Twelve (12) fuses of each size furnished

## **PART 2 PRODUCTS**

### **2-1. MANUFACTURERS**

- A. General
  - 1. Provide new 24V DC discrete input Modules and surge protection devices as indicated on the drawings.
- B. 24V DC Discrete Input Modules
  - 1. Provide two (2) new 24V DC Input Modules, each shall be a GE IC694MDL241. No substitutions shall be allowed.
- C. Surge Protection Devices.
  - 1. Provide Phoenix Contact #2794699 surge protection device, quantity as indicated in the contract documents. Provide and install additional din-rail,

end barriers and accessories as required to accommodate new surge protection devices as required.

D. Software and Documentation

1. Program the PLC in ladder logic using IBM compatible software. Provide all configuration software and all necessary interface hardware and cables under this Contract to become the property of the City. The software is to be designed, developed, and documented by the Contractor. The Contractor shall be responsible for providing the details of the design and supplying the City with a set of reproducible as-built drawings. The Operation and Maintenance Manual shall include program documentation containing ample comments and a narrative of the actual working program with a symbol cross-reference legend for the system.

**PART 3 EXECUTION**

**3-1. INSTALLATION AND APPLICATION**

A. Inputs and Outputs Isolation

1. Design PLC discrete inputs to monitor dry contact closures, sourced from the PLC enclosure.

B. Testing

1. Test all control function as described in Section 13400.

**3-2. INPUT/OUTPUT SIGNAL SUMMARY SCHEDULE**

A. The new input and output signals for the Annunciator system shall be as specified in section 13400 and as shown on the drawings. The I/O is summarized by location in the table below.

B. The I/O summary represents new PLC hard-wired inputs and outputs required for the additional monitoring requirements.

C. Spare I/O shall be installed, wired and interfaced to the terminal strips.

D. Expandability. Allow any or all prewired spare points to become active points. Include related documentation changes. Spares utilization will be subject to following limitations.

1. Change will not be made subsequent to Submittal approval of PLC panel or process area loop drawings.
2. Treat changing of active points to spare points in same manner as incorporation of spares.

D. Signal types to be added to the existing system are as follows:

1. DI Digital (discrete) Input
2. DO Digital (discrete) Output

PLC Location	Signal Quantity			
	DI	DO	AI	AO
Annunciator PLC	17	2	0	0

**3-3. ANNUNCIATOR PLC OPERATION**

- A. The PLC shall monitor the new inputs as shown and allow the existing OIT to display any alarm. The OIT display shall show each alarm individually in a flashing box mimicking the Annunciator(s) to be replaced (subject to approval of the City of Tampa, shop drawing for the Annunciator screen(s) shall be submitted for review).
- B. Each alarm shall be announced by the existing annunciator horn. If an operator depresses the ‘Silence’ push button the alarm horn will no longer announce the initial alarm. Pressing the ‘Silence’ button shall not affect the OIT display.
- C. If the operator depresses the ‘Acknowledged’ push button, the individual alarm on the OIT will no longer flash.
- D. The individual alarm will remain on the OIT display until the situation generating the initial alarm is no longer present.
- E. The initiation date and time of each individual alarm, the time and date of the alarm acknowledgement and the date and time at which an alarm is individual alarm no longer persists shall be provided to the existing SCADA PLC.

**END OF SECTION**

## SECTION 16050

### ELECTRICAL – GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1-1. SCOPE OF WORK

A. Furnish all labor, materials, equipment, transportation and performing all operations required to support the installation and commissioning of a new Bar Screen unit at the City of Tampa's University Pump Station. The work includes, but is not limited to, the following :

1. Submit working drawings, parts schedules and cut-sheets to the engineer.
2. Furnish and install all equipment as shown on the plans and described in the specifications.

Specifically :

A. Bar Screen Installation

1. The Contractor shall provide all conduit and conductors to accommodate the installation of the proposed Bar Screen and associated Bar Screen Control Panel. Contractor shall be required to provide all 480V power conductors and all 24V DC control circuits to insure proper operation of the Bar Screen and associated Control Panel. The Contractor shall be responsible for coordinating with the Bar Screen manufacturer to insure the requirements for the Bar Screen installation and operation are satisfied. This coordination may include, but may not be limited to, the installation and/or wiring of float level switches, ultrasonic level transducers, Bar Screen Local Control Station, Compactor Local Control Station, motor wiring, motor thermostats, solenoid valves, and all other ancillary equipment for a fully complete and functioning system. All conductors, connections, locations, etc. shall per the bar screen suppliers specifications.

B. Existing Annunciator Programmable Logic Controller (PLC)

1. The Contractor shall be responsible for making modifications to the existing Annunciator PLC in order to facilitate monitoring and control of the new Bar Screen and the new Slide Gate Actuator. This work shall include the installation of new 24V DC Discrete Input Modules, new surge protection devices and the termination of new I/O wiring. This effort shall also include making modifications to the existing PLC program and making modifications to the existing Operator Interface Terminal (OIT).

C. Motor Control Center (MCC) Modifications.

1. The Contractor shall provide and install two (2) new 3-pole, 600V 30 Ampere circuit breakers (Square D FHL36030) in an existing MCC in order to provide 480V, 3-phase power to the new Bar Screen Control Panel and the new Slide Gate Actuator.

D. System Outages

1. The Contractor shall coordinate all required outages/work with the City of Tampa. Prior to any outage, the contractor shall submit a written request to the City of Tampa. The request shall detail the nature of the outage, all equipment affected by the outage, the amount of time required for the outage and a contingency plan for the outage. The outage request shall be submitted to the City a minimum of 2 weeks prior to the date of the requested outage. The contractor shall not be allowed to initiate the outage prior to receiving written approval from the City of Tampa.
- E. The work, apparatus and materials, which shall be furnished under these Specifications and accompanying Drawings, shall include all items listed hereinafter and/or shown on the Drawings. All materials necessary for the complete installation shall be furnished and installed by the CONTRACTOR to provide complete power, instrumentation, wiring and control systems as indicated on the Drawings and/or as specified herein.
- D. The CONTRACTOR shall furnish and install the necessary cables, protective devices, conductors, supports, raceways, exterior electrical system, etc., to serve loads as indicated on the Drawings and/or as specified.
- F. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; sub-standard work will be rejected.
- G. It is the intent of these Specifications that the electrical system shall be suitable in every way for the service required. All material and all work, which may be reasonably implied as being incidental to the work of this Section, shall be furnished at no extra cost.
- H. Furnish and install a complete system of conduit as herein specified and shown on the drawings.
- I. Submit working drawings, parts schedules, cut-sheets, maintenance items to be performed and written testing protocol to the Engineer.

**1-2. CODES, INSPECTION AND FEES**

- A. All material and installation shall be in accordance with the 2014 edition of the National Electrical Code and all applicable national, local and state codes, laws and ordinances.

**1-3. TESTS**

- A. Test all systems and repair or replace all defective work. Make all necessary adjustments to the systems and instruct OWNER's personnel in the proper operation of the systems.
- B. The Engineer shall be notified forty-eight (48) hours before tests are made to enable the Owner to have designated personnel present.

**1-4. CUTTING AND PATCHING**

- A. All cutting and patching shall be done in a thoroughly workmanlike manner.

**1-5. INTERPRETATION OF DRAWINGS**

- A. The Drawings are not intended to show exact locations of conduit runs.
- B. Unless otherwise approved by the Engineer, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.
- C. Where circuits are shown as "home-runs," all necessary fittings and boxes shall be provided for a complete raceway installation.
- D. The locations of equipment, outlets, and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- E. Circuit layouts shown are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting, and other electrical systems shown. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.
- F. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are approximate only and are indicative of the probable power requirements insofar as they can be determined in advance of the purchase of equipment.
- G. All connections to equipment shall be made as shown, specified and directed and in accordance with the approved shop drawings, regardless of the number of conductors shown on the Contract Drawings.

**1-6. RECORD DRAWINGS**

- A. As the work progresses, legibly record all field changes on a set of project Contract Drawings. When the project is complete, furnish a complete set of reproducible "As-built" drawings for the Project Record Documents.

**1-7. COMPONENT INTERCONNECTIONS**

- A. Component equipment furnished under this Specification will not be furnished as integrated systems.

- B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.

**1-8. SHOP DRAWINGS**

- A. As specified under other Sections, shop drawings shall be submitted for approval for all materials, equipment, apparatus, and other items as required by the Engineer.
- B. Prior to submittal by the CONTRACTOR, all shop drawings shall be checked for accuracy and contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to Specifications and Drawings. This statement shall also list all discrepancies with the Specifications and Drawings. Shop drawings not so checked and noted shall be returned.
- C. The Engineer's check shall be only for conformance with the design concept of the project and compliance with the Specifications and Drawings. The responsibility of, or the necessity of, furnishing materials and workmanship required by the Specifications and Drawings, which may not be indicated on the shop drawings, is included under the work of this Section.
- D. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this Section.
- E. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.

**1-9. WARRANTY**

- A. Provide a warranty for all the electrical equipment in accordance with the requirements of other Sections. Under no circumstances shall the warranty be for less than one year starting from substantial completion.

**PART 2 – PRODUCTS (Not Used)**

**PART 3 – EXECUTION (Not Used)**

**END OF SECTION**

## SECTION 16075

### ELECTRICAL IDENTIFICATION

#### PART 1 GENERAL

##### 1-1. SUMMARY

- A. Section Includes: Requirements for providing materials for the identification of electrical equipment, components, conduits, cables and wiring, and furnishing and installing safety signs.
- B. Related Work Specified in Other Sections Includes:
  - 1. Section 16050 - Basic Electrical Materials and Methods

##### 1-2. REFERENCES

- A. Codes and standards referred to in this Section are:
  - 1. ANSI C2 - National Electrical Safety Code (NESC)
  - 2. ANSI Z535.1 - Safety Color Code
  - 3. ANSI Z535.2 - Environmental and Facility Safety Signs
  - 4. ANSI Z535.3 - Criteria for Safety Symbols
  - 5. OSHA - Occupational Safety and Health Act

##### 1-3. SUBMITTALS

- A. General: Furnish all submittals, including the following, as specified in the Specific/General Provisions.
- B. Product Data and Information: Furnish manufacturer's catalog data for safety signs, nameplates, labels and markers.
  - 1. Furnish manufacturer's instructions indicating application conditions and limitations of use; and storage, handling, protection, examination and installation of product.
- C. CONTRACTOR's Record Drawings: Furnish CONTRACTOR's record drawings accurately showing actual location of markers for underground ducts, handholes and manholes, at completion of the Project.

##### 1-4. DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in the Specific/General Provisions.

##### 1-5. SPARE PARTS

- A. General: Furnish the following spare parts.
  - 1. Ten safety signs of each size and wording.
- B. Packaging: Package spare parts in containers bearing labels clearly designating contents. Identify all spare parts with information needed for reordering. Deliver spare parts in original factory packages.

## **PART 2 PRODUCTS**

### **2-1. MANUFACTURERS**

- A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.
  - 1. W. H. Brady Company
  - 2. Seton
  - 3. Thomas & Betts

### **2-2. MATERIALS AND COMPONENTS**

- A. General: Provide identification materials listed and classified by UL or tested by an acceptable Electrical Testing Company certifying the equivalence of the materials to UL listing requirements and OSHA approved.
- B. Laminated Plastic Nameplates: Provide engraved three layer laminated plastic nameplates with black letters on white background and fastened with corrosion-resistant screws. Do not use mounting cement for fastening nameplates.
  - 1. Provide nameplates with 1-inch high lettering for Motor Control Center buckets which have been modified under this contract, as well as, the new Bar Screen Controller and Slide Gate Actuator.
- C. Wire Markers: Identify wire bundles and each individual wire.
  - 1. Wire bundles: Provide a brass or rigid fiber identifying tag attached with nylon self locking "Ty-Raps".
  - 2. Wire identification markers: Provide a printed white, heat-shrink, seamless tubing type with black bold lettering for wires size No. 10 AWG and smaller. Provide a printed self-laminating white, vinyl type with black bold lettering for wires No. 8 AWG and larger.
- D. Safety Signs: Provide safety signs in accordance with OSHA standard meeting the requirements of ANSI C2, ANSI Z535.1, ANSI Z535.2 and ANSI Z535.3.
  - 1. Provide safety signs manufactured from vinyl having a minimum thickness of 60 mils with red and black letters and graphics on a white background.

2. Size: 10 inches by 14 inches except signs 7-inch by 10-inch may be provided where the larger size cannot be applied.
3. Mount safety signs using corrosion-resistant screws. Do not use mounting cement.

### **PART 3 EXECUTION**

#### **3-1. PREPARATION**

- A. Surface Preparation: Degrease and clean surfaces to receive nameplates, labels and marking paint.

#### **3-2. INSTALLATION**

- A. General: Install nameplates on the front of equipment, parallel to the equipment lines and secured with corrosion resistant screws.
  1. Install laminated nameplates identifying:
    - a. Each electrical equipment enclosure
    - b. Individual equipment and devices
- B. Wire Markers: Identify wire bundles and each individual wire with identification tags as follows:
  1. Wire Bundles: Install an identifying tag engraved with the conduit number where conduits enter motor control centers, switchgear, switchboards, control panels, terminal boxes and the like.
  2. Wire identification markers: Provide wire identification markers on each wire at all termination points.
    - a. On power and lighting circuits: The branch circuit or feeder number as indicated on drawings
    - b. On control circuits terminated in motor control center, control panels and alike: The field device and terminal number of the opposite end connection.
    - c. On control circuits at each field device: The panel or compartment number and terminal number of the opposite end connection.
  3. Oversize wire markers so that after heat shrinking the wire marker can be rotated on the wire. Rotate wire markers so that wire identification number is visible.

**END OF SECTION**

## **SECTION 16445**

### **MOTOR CONTROL CENTER MODIFICATIONS**

#### **PART 1 GENERAL**

##### **1-1. SUMMARY**

- A. Section Includes: Requirements for providing new components for an existing motor control center.
- B. Related Work Specified in Other Sections Includes:
  - 1. Section 16050 - Basic Electrical Materials and Methods
  - 2. Section 16075 - Electrical Identification

##### **1-2. REFERENCES**

- A. Codes and standards referred to in this Section are:
  - 1. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Not More than 2000 Volts AC or 750 Volts DC.
  - 2. NEMA ICS 3 - Industrial Control and Systems Factory Built Assemblies
  - 3. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
  - 4. UL 486A - Wire Connectors and Soldering Lugs for Use With Copper Conductors
  - 5. UL 845 - Motor Control Centers

##### **1-3. SYSTEM DESCRIPTION**

- A. This section defines the required modifications required to the existing University Pump Station Motor Control Center (MCC) identified in the contract documents. The existing MCC is a Square D Type 4 unit.

##### **1-4. SUBMITTALS**

- A. General: Furnish all submittals, including the following, as specified in the Specific/General Provisions and Section 16050.
- B. Product Data and Information: Provide catalog data for all associated equipment and devices.

- C. Shop Drawings: Furnish shop drawings customized to the project for the motor control center modifications to include the following:
  - 1. Outline drawings showing dimensions, weights, arrangement, elevations, identification of components and a nameplate schedule for all units.
  - 2. Bill of materials including manufacturers' name and catalog number.
  - 3. Interconnecting wiring diagrams, where required.
  - 4. Individual schematic and wiring diagrams for each compartment.
  - 5. Furnish instruction booklets and time-current curves for each circuit breaker supplied.
- D. Operation and Maintenance Manuals: Furnish operation and maintenance manuals.

**1-5. QUALITY ASSURANCE**

- A. Standards: Provide motor control center components in accordance with NEMA ICS 2, ICS 3, and UL Standard No. 845.
- B. UL Label: Provide a UL Label each component supplied for each motor control center.

**1-6. DELIVERY, STORAGE AND HANDLING**

- A. General: Deliver, store, and handle all products and materials as specified in the 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.

**PART 2 PRODUCTS**

**2-1. MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Motor Control Center Components:
    - a. Square D Type 4 series.

## **2-2. MOTOR CONTROL CENTER COMPONENTS**

- A. Basic Components:
  - 1. Provide hinges, screws, bolts, circuit breaker operating mechanisms, nameplate mounting screws and other metallic appurtenances with a noncorrodible metal covering.
  
- B. Circuit Breaker Units: Provide new circuit breaker units in existing 12-inch (2U) spaces in the MCC as indicated in the contract documents.
  - 1. Provide and install new 3-pole, 600v, 30 Ampere circuit breakers (Square D FHL36030) as indicated in the contract documents.
  - 2. Existing MCC does not consist of stab-on circuit breaker arrangement. Contractor shall provide cable-on bus connections with new copper conductors for both new circuit breaker line side feeders.
  - 3. Provide and install a new door for the two (2) buckets to be modified. Provide each door with hinges and screw fasteners for holding the door closed. Note: cutting the existing door to accommodate the new circuit breaker operating mechanism is not considered an acceptable substitution for providing and installing a new bucket door.
  - 4. Equip the door with a circuit breaker operating mechanism.
  - 5. Provide mechanical interlocks between the compartment door and circuit breaker operating mechanism to prevent opening of the door unless the breaker is in the OFF position, and to prevent closing the breaker unless the door is fully closed.
  - 6. Provide circuit breaker operating mechanisms or handles that are padlockable in the OFF position with room for a minimum of three padlocks.
  - 7. Provide unit having devices that are serviceable from the front, without provisions for rear access.
  
- C. Make modifications as indicated to the interior of the associated buckets as indicated in the contract documents.
  
- D. Identification: Provide nameplates having the same type, appearance and shape throughout each motor control center in accordance with the requirements of Section 16075.

## **PART 3 EXECUTION**

### **3-1. INSTALLATION**

- A. General: Install all equipment in accordance with the manufacturer's recommendations and approved shop drawings and as specified in the Specific/General 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 486 A.

**3-2. FIELD QUALITY CONTROL**

- A. Inspections: Inspect, adjust and check the installation for physical alignment, cable terminations and ventilation.
- B. Tests: Perform the following field tests:
  - 1. Close and open circuit breaker to test operation.

**3-3. CLEANING AND PAINTING**

- A. Field Painting: Clean and touch up any scratched or marred surface to match original finish.

**END OF SECTION**

SPECIFICATIONS

WORKMANSHIP AND MATERIALS

SECTION 1 - EXCAVATION - EARTH AND ROCK

W-1.01 General

Open-cut 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 open-cut 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 D 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 D concrete, or select sand or crushed stone fill material, and properly compacted, as ordered by the Engineer, and no separate payment will be made therefore.

#### 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 madetherefor.

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 D 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 madetherefor.

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.

#### W-1.12 Excavation for Jacking and Augering

Excavation for jacking or augering shall meet the requirements of the Workmanship and Materials section headed "Jacking and Augering."

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## 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, clay, 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 or limestone screenings, 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 D 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 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 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 drydensity 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 18 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.

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## SECTION 4 - CONCRETE, MORTAR AND GROUT MATERIALS

### W-4.01 General

The materials covered under this section are cement, sand, crushed stone, gravel, admixtures and water for use in concrete, mortar and grout.

### W-4.02 Uniformity of Materials

Cement, fine and coarse aggregate and admixtures used in concrete for interior and exterior concrete surfaces shall be identical in type, color and size to provide a consistently uniform concrete finish.

### W-4.03 Cement

Cement shall be that as manufactured by Florida Portland Cement or equal and shall be a domestic product from a source approved by the Engineer. Notarized Certificates of Manufacture as evidence that the cement conforms to the specified requirements shall be furnished. These certificates shall include mill-test reports on the cement. Cement shall be standard portland cement meeting the requirements of ASTM C 150 Type II.

Standard portland cement without an air-entraining agent shall be used in the manufacture of concrete pressure pipe and may be used in the manufacture of concrete sewer pipe by processes using a nonplastic (0 slump) mix.

### W-4.04 Fly Ash

Fly ash shall be a local product from a source approved by the Engineer with cementitious properties conforming to the requirements of ASTM C 618, Class C or F, with the following exceptions:

Loss on ignition - 5% maximum  
Sulfur trioxide - 4% maximum

Fly ash shall have a uniform light color. Notarized Certificates shall be furnished by the supplier to verify that the fly ash meets these requirements.

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.

### W-4.05 Delivery and Storage of Cement

Cement delivered in bulk to the batching plant shall be stored in weathertight bins and batched by an appropriate weighing device, in accordance with ASTM C 94.

Cement shall be stored in weathertight buildings, bins or silos which will exclude moisture and contaminants. Cement that has deteriorated from storage shall not be used. Cement stored for a period longer than 6 months after testing shall be retested before use, and rejected if it fails to meet

all of the specified requirements. Accepted cement that has been in storage for more than one year from the time of original acceptance shall not be used.

Cement delivered to the job site shall be in strong, well-made bags plainly marked with the brand, name of manufacturer and net weight. Packages received in a damaged condition will be rejected.

Ready-mixed concrete delivered shall be accompanied by delivery tickets showing the following:

1. Date and time leaving the plant
2. Type of cement and weight
3. Quantity of water and time added
4. Aggregate moisture correction factor
5. Admixtures and weight
6. Site arrival time
7. Site leaving time
8. Type of fly ash and weight

#### W-4.06 Samples of Aggregates

At least 15 days before the first concrete is to be used, a 50-pound representative sample of each aggregate shall be submitted to the Engineer for approval. As the work proceeds, additional samples shall be submitted if and when required by the Engineer.

#### W-4.07 Fine Aggregate

Fine aggregate shall be natural sharp sand meeting the requirements of ASTM C 33, except as modified herein.

Fine aggregate subjected to the test for organic impurities and producing a color darker than standard will be rejected without exceptions.

Fine aggregate shall meet the requirements of the soundness test set forth in Paragraph 7.1 of ASTM C 33. The exceptions stated in Paragraphs 7.2 and 7.3 shall not apply.

Fine aggregate for mortar and grout shall be well graded within the following limits by weight when tested in accordance with ASTM C 136.

<u>Sieve</u>	<u>Percentage Passing</u>	
	<u>Mortar</u>	<u>Grout</u>
3/8-inch	100	100
No. 4	100	100

No. 8	96 to 100	96 to 100
No. 16	70 to 90	70 to 90
No. 30	40 to 70	50
No. 50	15 to 35	5 to 35
No. 100	5 to 15	5 to 15

W-4.08 Coarse Aggregate

Coarse aggregate shall consist of gravel or crushed stone meeting the requirements of ASTM C 33. The limits for deleterious substances and physical property requirements given in Table 3 shall apply for each concrete class designation without exception. Coarse aggregate shall be graded according to Size No. 467, No. 57, or No. 67 Table 2.

Size No. 57 or No. 67 shall be used for all thin or closely reinforced concrete work, such as floors and roofs less than 7 inches thick, walls less than 9 inches thick, all beams, girders, struts, columns, and all fireproofing. Size No. 57, 67 or No. 467 shall be used for all other concrete work; however, gradation sizes shall not be mixed.

W-4.09 Storage and Handling of Aggregates

Aggregates shall be kept clean and free from all other materials during transportation and handling. They shall be kept separated from each other until measured in batches and placed in the mixer.

Aggregates shall be stockpiled in a manner to prevent segregation unless finish screening is provided at the batch plant.

W-4.10 Admixtures

Admixtures shall be used as specified under the Workmanship and Materials section headed "Concrete".

The use of admixtures shall be limited to an air-entraining admixture conforming to ASTM C 260, water-reducing admixtures conforming to ASTM C 494, Type A, and water-reducing set retarders conforming to ASTM C 494, Type D. All concrete, except Class D, shall contain an air-entraining admixture.

Water-reducing and set-retarding admixtures shall be used only with the written permission of the Engineer. Test data shall be provided indicating that the concrete containing the admixtures has improved workability and does not show any abnormal behavior such as premature stiffening or slump loss for at least 30 minutes after mixing has been completed, or any other abnormal differences when compared with concrete made without the admixture. Such test data shall be based on fresh concrete from the proposed supplier, using batching equipment proposed for use on the project.

Admixtures containing calcium chloride, thiocyanates or more than 0.05 percent chloride ion are not permitted. Written conformance to the above requirements and the chloride ion content of each admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

When more than one admixture is used, each admixture shall be dispensed separately into the mix, and at different times during mixing, in accordance with the recommendation of ACI Committee 212. After system approval, no changes shall be made in batching equipment or concrete constituents without approval of the Engineer.

\* \* \*

SECTION 5 - CONCRETE

W-5.01 General

Concrete supplied and placed under this Contract shall be divided into various classes according to use and compressive strength.

Class A concrete shall be used for all precast concrete units.

Class B concrete shall be used for all reinforced concrete structures designed for high strength and watertightness; and shall be used for columns, walls, beams, slabs and, in general, wherever formwork other than simple forms is required.

Class C concrete shall be used for all reinforced concrete structures designed for high strength and watertightness; and shall be used for bottoms of structures, electrical duct encasement, and, in general, where concrete is deposited directly on the bottoms or slopes of excavations and where only simple forms are required.

Class D concrete shall be used for low-strength concrete, plain or reinforced, used for work mats beneath structures, soil stabilization, pipe cradles and encasement, filling, and other similar purposes. Clean boulders or fragments of rock excavated during construction may be embedded in large volumes of Class D concrete to provide added bulk. Care shall be taken in placing the boulders or rock fragments so that there will be no voids in the concrete.

W-5.02 Strength

The specified compressive strength of concrete in pounds per square inch for the classes previously described shall be as follows. The 28-day strength shall be designated as  $f'_c$ .

<u>Class</u>	<u>7-Day Test</u>	<u>28-Day Test</u>
A	3,400	5,000
B	2,700	4,000
C	2,700	4,000
D	1,300	2,000

Concrete shall be proportioned and produced to provide an average 28-day compressive strength in excess of the specified compressive strength,  $f'_c$ . The required proportions shall be based on tests of cylinders made, cured and tested as prescribed herein.

Mix designs shall be prepared for each type of concrete required and submitted for approval. Concrete of any class which will be placed by pumping methods will require a separate mix design and mix design approval, as described herein, in addition to the mix design approval required for other placement methods.

W-5.03 Selection of Concrete Proportions

Concrete proportions shall be selected to provide the required strength and durability and to provide workability and consistency so that the concrete can be worked into forms and around reinforcement without segregation or excessive bleeding.

Concrete for all water-containing structures and all structures constructed below grade shall be watertight. For this concrete, the maximum water-cement ratio shall not exceed 0.50 by weight of the total cementitious constituent. The quantity of water shall be the total quantity, including free surface moisture contained in the aggregates.

Class B and C concrete may contain fly ash in an amount not to exceed 150 pounds per cubic yard, and shall have a minimum cement content of 350 pounds per cubic yard.

Concrete proportions including the water-cement ratio shall be established on the basis of field experience or trial mixtures with the materials to be used in accordance with Section 4.3 of ACI 318. All test results shall be submitted for approval a minimum of 35 days before concrete is placed.

W-5.04 Entrained Air Content

All Class B and C concrete shall be air entrained with an average total air content of 5 percent. Tolerance on air content as delivered shall be plus or minus 1.5 percent. Air content tests in accordance with ASTM C 138 or C 173 shall be submitted with mix design data.

W-5.05 Consistency

When tested in accordance with ASTM C 143, concrete mix design slumps shall be within the following limits:

<u>Concrete Placement</u>	<u>Minimum and Maximum Slump in Inches</u>	
	<u>Class A, B, and C</u>	<u>Class D</u>
Normal	3 to 4	2 to 4
Pumped	4 to 6	4 to 6

Mix design slump shall be based on the concrete mix without water reducing admixture. For production concrete, slump may be increased up to 1 inch by use of specified water reducing admixtures. For pumped concrete, slump shall be measured at end of hose.

The combined aggregates shall be graded such that when a sample of the mix is separated on No. 4 standard sieve, the weight passing the sieve shall be not less than 30 percent nor greater than 45 percent of the total, unless otherwise specified.

W-5.06 Architectural Concrete

Architectural concrete shall be air entrained with a total air content of at least 4 percent but

not to exceed 5 percent. Mix proportions for architectural concrete shall provide a workable mixture of proper strength. The maximum water cement ratio shall not exceed 0.50 by weight and the ratio provided shall be consistent from batch to batch. Slump for architectural concrete shall not exceed 5 inches, nor shall the temperature at the time of placement exceed 80 degrees F. Retarding admixtures may be used in architectural concrete subject to prior approval.

#### W-5.07 Water Reducing Admixtures

Where the proportions of aggregates, cement and mixing water conforming to the specification requirements produce a concrete with a slump less than the minimum required, a water-reducing admixture shall be used to obtain improved workability. Water-reducing admixtures shall comply with the requirements of the Workmanship and Materials section headed "Concrete, Mortar and Grout Materials."

#### W-5.08 Strength Tests - Laboratory Cured Cylinders

Concrete test cylinders will be tested at a laboratory designated by the Engineer. The costs for testing and preparation of reports will be the responsibility of the Engineer. The Contractor shall furnish all labor and materials required to assist the Engineer in making concrete test cylinders.

During the progress of the work, concrete compressive strength tests shall be made as directed and as required. Test cylinders shall be made, cured, and stored in accordance with ASTM C 31 and will be tested in accordance with ASTM C 39. Each test shall consist of three cylinders. One laboratory-cured cylinder will be tested at 7 days, and one field-cured cylinder will be tested at 28 days. If the 7-day cylinder is not satisfactory, the third cylinder, a laboratory-cured cylinder, will be tested at 7-days. Otherwise, the third cylinder will be tested at 28 days.

The strength level of the concrete mix for each individual class of concrete shall be considered satisfactory when:

- a. The average of all sets of three consecutive 28-day strength tests equal or exceed the specified compressive strength ( $f'_c$ ).
- b. No individual 28-day strength test (average of two cylinders) falls below  $f'_c$  by more than 500 psi.

If the requirements of either (a) or (b) are not met, changes in the mix proportions shall be made immediately to achieve the required strength.

#### W-5.09 Low Concrete Strength Test Results

If the Engineer determines the serviceability of the concrete is significantly reduced by low concrete strength test results, test cores shall be taken by the Contractor from the area in question. Cores shall be drilled and tested in accordance with ASTM C 42 except as noted. Three cores shall be taken for each strength test more than 500 psi below the specified  $f'_c$ .

Concrete in the area represented by core tests shall be accepted if the average of three cores is equal or greater than  $0.85f'_c$  and no single core is less than  $0.75f'_c$ .

Concrete which does not meet the core tests requirements shall be removed and replaced at the expense of the Contractor.

#### W-5.10 Measurement and Mixing

Measurement and mixing of concrete shall be performed in accordance with recommendations of ACI 304, as modified herein.

Cement, and fine and coarse aggregates shall be measured separately by weight by equipment providing an accuracy within one percent of the net load weighed. Cement and water shall be measured within 1 percent accuracy. Aggregates shall be measured within 2 percent accuracy. Admixtures shall be measured within 3 percent accuracy by weight.

The accuracy of the weighing equipment shall meet the requirements of the United States Bureau of Standards. Standard testing weights and other necessary equipment shall be available at all times for testing the equipment.

Concrete shall be mixed in a rotary, batch-type mixer of adequate design to produce a thorough mix, homogeneous in composition and uniform in color. Each batch of one cubic yard or less shall be mixed not less than 1-1/2 minutes after the last of the ingredients have been added to the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof.

#### W-5.11 Ready-Mixed Concrete

Ready-mixed concrete shall meet the requirements of ASTM C 94, except as modified in the following paragraphs, and shall be subject to all provisions herein relative to materials, strength, proportioning, consistency, and testing. Article 18 of ASTM C94, however, shall not apply. In the event of low strengths, procedures outlined in the subsection headed "Low Concrete Strength Test Results" shall apply.

The rate of delivery of the mixed concrete shall be such that the interval between placing of fresh concrete in contact with concrete already placed from previous 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 60 minutes, including mixing and agitating time.

Delivery of concrete in nonagitating equipment will not be permitted.

No water shall be added to the concrete at the site, unless approved by the Engineer for a specific batch. Approval of such addition to one batch shall not be construed as approval of additions to subsequent deliveries.

The Contractor shall prepare a detailed concrete field record in which the following information is identified:

- a. Number of concrete batches produced.
- b. Proportions of materials used.
- c. Approximate location of final deposit of each batch in the structure.

- d. Time and date of mixing and placing.

#### W-5.12 Forms - General

Forms shall be designed in accordance with the recommendations of ACI 347. The presence of fly ash in the mix will delay the setting time, which shall be considered in the design of the forms. The Contractor shall be solely responsible for adequate design of all form elements for support of the wet concrete mixtures specified and as delivered.

Forms shall be designed to produce concrete members identical in shape, lines and dimensions to the members shown. They shall be substantial, properly braced, and tied together 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 thickness and character of form lumber and size and spacing of studs and wales shall be determined by the nature of the work and the height to which concrete is placed and shall be adequate to produce true, smooth surfaces with not more than 1/8-inch variation in either direction from a geometrical plane. Horizontal joints shall be level, and vertical joints shall be plumb.

Forms for the sides of columns and beam and girder soffits shall be constructed with 2-inch lumber, and all joints shall be tight and even. Beam and girder soffits shall be erected with a camber of 1/2-inch in 20 feet and sufficiently braced, shored, and wedged to prevent deflection. Column sides shall be clamped with metal column clamps, which shall be spaced according to the manufacturer's directions, in accordance with this specification.

Beam and girder soffits shall be erected with a camber of 1/2-inch in 20 feet and sufficiently braced, shored, and wedged to prevent deflection. Column sides shall be clamped with metal column clamps, which shall be spaced according to the manufacturer's directions, in accordance with this specification.

External angles of walls, beams, pilasters, columns, window openings and girders shall be provided with 3/4-inch bevel strips.

Forms for repeated use shall be supplied in sufficient number to ensure the required rate of progress. All forms shall be thoroughly cleaned before reuse and shall be inspected immediately before concrete is placed. Deformed, broken, or defective forms shall be removed from the work. Temporary openings shall be provided in forms at convenient locations to facilitate cleaning and inspection.

The entire inside surfaces of forms shall be coated with a suitable form release agent immediately before, during or after erection just prior to placing concrete. No form release agent shall be permitted on the reinforcing steel.

The Contractor shall be responsible for the adequacy of all forms and for remedying any defects resulting from their use.

Butt joints at corners and bottoms of placements shall be sealed with closed cell impregnable form gaskets with adhesive bucking.

#### W-5.13 Forms for Architectural Concrete

Forms for smooth finish architectural concrete shall be constructed with 3/4-inch thick, High Density Overlay (HDO) Plyform, Class 1, meeting the requirements of the American Plywood Association. The weight of the surfacing materials shall be not less than 60-60. Surfaces of architectural concrete panel forms shall be given one thinned coat of form film, as manufactured by A.C. Horn Corporation, Brooklyn, NY, W.R. Grace & Company, or equal. Thinner used shall be as recommended by the manufacturer of the form film. HDO plyform panels, once used, shall be thoroughly cleaned and lightly recoated before each additional use.

Where rustications are shown, form panels shall be in one piece, of the sizes shown. Rustications shall be formed with plastic, 2-piece, snap-on strips as manufactured by the Symons Corporation, Chicago, IL, Gateway Corporation, Chicago, IL, or equal.

Forms for smooth concrete shall be installed in a manner such that there will be no horizontal form joints and aligned so that vertical joints will occur only at "V-groove" rustications.

#### W-5.14 Form Ties

Form ties, hangers, and clamps shall be submitted for approval by the Engineer. They shall be of such type that, after removal of the forms, no metal will be closer than one inch from the surface. Wire ties will not be permitted. Lugs, cones, washers, or other devices that will leave holes or depressions at the surface of the concrete greater than 7/8-inch in diameter shall not be fitted within the forms. Ties which are to be left in place shall be provided with swaged washers or other suitable devices to prevent seepage of moisture along the ties. The spacing of form ties, hangers, and clamps shall be strictly in accordance with the manufacturer's directions, and the removable portions shall be coated with cup grease or other approved material.

Form ties in architectural concrete shall be she-bolts with water seals and shall be spaced in a uniform pattern vertically and horizontally. Form ties in smooth concrete bands shall be positioned to be within the "V-groove" rustications. The proposed form tie pattern for all architectural concrete shall be submitted for approval. The pattern shall be similar to that shown, or as approved.

Tie holes shall be plugged flush with the surface using portland cement mortar. Tie holes shall be pre-wet with clean water after which a neat cement slurry bond coat shall be applied. Mortar of a dry-tamp consistency shall then be densely tamped into the tie holes exercising care so as not to smear mortar onto the finished concrete surface. The mortar mix shall include sufficient white cement to cause the plugged holes to blend in with the adjacent surfaces. Sample patches with different mixes shall be made to assure that this requirements is met.

#### W-5.15 Removal of Forms

In general, forms shall not be removed until the concrete has hardened sufficiently to support its own load safely, plus any superimposed load that might be placed thereon. The forms shall be left in place for the minimum length of time indicated below or until the concrete has reached the minimum strength indicated as determined by testing, whichever time is reached first. The times indicated represent cumulative days or hours, not necessarily consecutive, during which the air surrounding the concrete is above 50 degrees F. These times may be decreased if reshores are installed.

Minimum

	Minimum Time	Strength (psi)
Columns	7 days.	2700
Side forms for girders and beams	7 days	2700
Walls	7 days	2700
Bottom forms of slabs:		
Under 10 feet clear span	4 days	2300
10 to 20 feet clear span	7 days	2700
Over 20 feet clear span.	10 days	2900
Bottom forms of beams and girders:		
Under 10 feet clear span	7 days	2700
10 to 20 feet clear span	14 days	3000
Over 20 feet clear span.	21 days	3500

Forms for vertical architectural concrete surfaces shall not be removed sooner than 12 hours nor longer than 24 hours after placement of concrete.

These times shall be increased as required if the concrete temperature following placement is permitted to drop below 50 degrees F, or if fly ash is used in the concrete mix.

The removable portion of form ties shall be withdrawn from the concrete immediately after the forms are removed. Holes left by such ties shall be filled with grout from a grout gun and the entire surface shall be finished with a steel spatula or rubbed with sackcloth in accordance with the subsection entitled Concrete Surfaces. On architectural concrete and on exposed interior surfaces of buildings, where appearance is important, white cement shall be added in the patching grout to achieve uniformity in color. Prior to patching tie holes in any area where appearance is important, a sample section varying the proportions of white cement to gray cement shall be prepared to determine the proper mixture necessary to achieve a uniformly colored surface.

#### W-5.16 Reshoring

In the event early stripping of forms becomes necessary, the Contractor shall develop a system for such early removal. The system shall include details and schedules for each element which is to be reshored.

#### W-5.17 Placing Concrete

Concrete shall be placed only in the presence of the Engineer. Where the procedure is not specified, the placing of concrete shall be in accordance with the recommendations of ACI 304.

No concrete shall be placed after its initial set has occurred, and no retempered concrete shall be used under any conditions. Concreting operations shall be continuous until the section, panel, or scheduled placement is completed. Should the concreting operations be unavoidably interrupted, construction joints shall be formed at proper locations as specified.

Concrete shall be conveyed and placed with minimum handling and shall be deposited in the forms as close as possible to its final position and in no case more than 5 feet in a horizontal direction therefrom. Rehandling of concrete will not be permitted.

Concrete shall be placed in horizontal layers shallow enough so that the previous layer is still soft when the next layer is added and the two layers can be vibrated together. Layers shall not exceed 18 inches in depth.

Wall and column concrete shall be deposited through heavy duck canvas or galvanized steel chutes equipped with suitable hopper heads. Chutes shall be of variable lengths so that the free fall of concrete shall not exceed 3 feet. Where required, illumination shall be provided inside the forms so that the concrete is visible from the deck and runways at the point of deposit.

Freshly placed exposed concrete shall be protected against damage from the elements or other sources.

#### W-5.18 Vibrating

All concrete shall be consolidated by means of mechanical internal vibrators applied directly into the concrete in a vertical position in accordance with the recommendations of ACI 309.

The intensity and duration of vibration shall be sufficient to cause concrete to combine with previously placed concrete, to fill corners, to compact thoroughly and to embed reinforcement, pipes, conduits, and similar work completely. Vibrators shall be inserted into and withdrawn from the concrete vertically at close intervals. Vibrators shall not be used to cause concrete to move laterally.

A sufficient number of vibrators shall be on hand to assure that the incoming concrete can be properly compacted within 15 minutes after placing. Reserve vibrators shall be on hand for use when others are being serviced. No placement of any concrete shall commence with a single vibrator on hand.

#### W-5.19 Hot Weather Requirements

For placement of concrete during hot weather, the recommendations of ACI 305.1 shall be followed. No concrete shall be placed if the temperature of the concrete at the time of placement exceeds 90 degrees F. Where the temperature of the concrete being placed is consistently above 75 degrees F and a noticeable decrease in slump or an increase in mixing water demand occurs, a retarding admixture shall be used. Admixtures shall conform to the Workmanship and Materials section headed "Concrete, Mortar and Grout Materials" and shall be used only with the written permission of the Engineer.

Unformed surfaces of concrete placed during hot weather shall be protected from drying by continuous moist curing for at least 24 hours. Curing shall be started as soon as the concrete has hardened sufficiently to withstand surface damage. If moist curing is not carried beyond 24 hours, the surface while damp shall be covered with a suitable heat-reflecting plastic membrane or sprayed with a white pigmented curing compound.

#### W-5.20 Cold Weather Requirements

For placement of concrete during cold weather, the recommendations of ACI 306.1 shall be followed, except set-accelerators will not be permitted.

Before placement of concrete, all ice, snow and frost shall be completely removed from all surfaces to be in contact with the concrete. Concrete shall not be placed on a frozen subgrade. Surfaces to be in contact with the concrete shall be at a temperature as near as practical to that of the concrete being placed.

When mean daily temperatures at the site are generally below 40 degrees F, the temperature of the concrete as placed shall be not less than 50 degrees F, except for mass concrete where the temperature of the concrete as placed shall be not less than 45 degrees F. Heating of aggregates or mixing water or both shall be used to obtain these placement temperatures. The concrete temperatures as mixed shall not be permitted to exceed the placement temperature by more than 10 degrees F for air temperatures of 0 degree to 30 degrees F, nor by more than 15 degrees F for air temperatures below 0 degree F.

Concrete in place shall be maintained at a temperature of 50 degrees F by keeping forms in place, covering with insulated blankets, heated enclosures or combinations of these for the following minimum time intervals except that forms shall not be removed in less than the time specified in the subsection headed "Removal of Forms."

- |    |  |   |
|----|--|---|
| a. | Footings and walls below grade<br>days and slabs on grade                      | 2 |
| b. | Exposed walls and columns<br>days carrying no load                             | 3 |
| c. | Exposed floor slab, beams and girders<br>days above grade and partially loaded | 6 |

Exposed surfaces of new concrete shall be protected from drying out. When dry heating is used for protection against low temperatures, exposed concrete surfaces shall be covered with an approved sheet material or membrane as specified in the subsection headed "Curing." Water curing may be used if icing problems can be avoided.

Concrete shall be cured during the period of low temperature protection for such additional time as required. Curing shall conform to the requirements of the subsection headed "Curing." During periods of very cold weather, the Contractor shall continue the protection against low temperature during the extended curing period to prevent freezing of the concrete as required.

Concrete which is to be exposed to freezing temperatures shall be permitted to undergo some drying just prior to and during the period of adjustment to ambient cold-weather conditions. When protection against low temperatures is removed, the resulting temperature drop in any part of the concrete shall not exceed 5 degrees F per hour nor 40 degrees F for the first 24 hour period.

#### W-5.21 Curing

In general, the recommendations of ACI 308 shall be followed for curing concrete.

Standard portland cement concrete surfaces normally exposed to the atmosphere shall be protected against too rapid drying by curing for a minimum period of 7 days. When daily average temperatures are below 70 degrees F, the curing period shall be extended as required in the subsection headed "Cold Weather Requirements." The curing period shall commence immediately

following the placing of the concrete. Curing shall be accomplished by one of the following methods. Should there be any delay in the application of the method of curing used, the concrete shall be covered with moistened burlap held in complete contact with the surface or kept wet by continuous sprinkling.

- a. Water Curing. Water curing shall be accomplished by the use of quilted covers wetted and applied to the concrete surface as soon as the forms have been removed, or in the case of slabs, as soon as the concrete has set up sufficiently to prevent marring of the surface. These quilted covers shall consist of an outer covering of burlap or cotton or other approved material, and a needled, punched or sandwiched inner layer of cotton batting or other approved material, in all weighing not less than 20 ounces per square yard. The covering material shall be maintained in a thoroughly saturated condition and shall show the presence of free water between the mat and the surface of the concrete at all times throughout the curing period.
- b. Sheet Materials. Curing of concrete slabs may be accomplished through the use of sheet materials such as waterproof paper or polyethylene film, both meeting the requirements of ASTM C 171, and applied to the concrete surface as soon as it has set sufficiently hard to prevent marring. The concrete surface shall first be thoroughly wetted, and the sheet materials shall then be placed in direct contact and anchored thereto in a manner to assure continuous contact throughout the curing period. The sheet materials shall be lapped a minimum of 3 inches with the seams taped, cemented, or glued. The paper shall consist of one ply of an approved type of fiber, reinforced waterproof building paper, consisting of cross fibers embedded in asphalt, between two layers of waterproof building paper, the whole being combined under heat and pressure to form a monolithic sheet. Polyethylene film shall be white opaque sheeting manufactured from virgin resin and shall contain no scrap or additives. It shall be not less than 4 mils in thickness and shall not easily tear, puncture, or otherwise become unfit for use. If, in the opinion of the Engineer, discoloration is objectionable, polyethylene film shall not be used on floors which have been steel troweled to a hard finish.
- c. Membrane Curing. Membrane curing shall be started immediately after removal of forms or in the case of unformed surfaces, as soon as the water sheen has disappeared from the surface of the concrete and shall be accomplished by coating the entire exposed surface with a liquid membrane-forming compound containing a temporary color indicator applied uniformly by means of an approved pressure spray distributor at the rate of 200 square feet per gallon of material. The material shall be applied so that the concrete surface is completely coated and sealed at one application. The compound shall meet the requirements of ASTM C 309 Type I. Membrane shall not be applied to faces of construction joints or other surfaces against which additional concrete will be placed. Such surfaces shall be kept continuously wet by other means.

Membrane curing shall not be used on surfaces which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete, such as other concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials unless otherwise approved by the Engineer.

### W-5.22 Joints and Bonding

Construction joints shall be made where shown or permitted. Such joints shall be located to ensure stability, strength, and watertightness, and shall have a waterstop where shown. All corners shall be built monolithically, and the concrete on either side shall be continuous to points shown.

At least 2 hours shall elapse after placing concrete in the columns or walls before depositing concrete in beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed integrally therewith.

Horizontal keyways shall be built to permit flushing water to escape from the keyways.

Joints shall have continuous, straight, and regular keys or grooves. Exposed concrete surfaces shall be brought to a true level line at the top of every horizontal construction joint. The exposed construction joints shall have a row of form ties located in the concrete at from 4 to 6 inches from the joint to tighten the forms for subsequent sections. Reinforcing rods shall be set to extend into subsequent sections of construction, as shown. Water stops, if required, shall have watertight splices and corner intersections and meet the requirements of the Workmanship and Materials section headed "Construction and Expansion Joints for Concrete." All bulkheads or other joint forming material shall be removed before placing adjacent concrete.

The placing of concrete shall be carried on continuously between the construction joints shown. If for any reason it becomes necessary to stop the placing of concrete at locations other than those indicated, such locations and the manner of making the joint shall be subject to the approval of the Engineer.

Concrete surfaces against which the new concrete is to be placed shall be thoroughly cleaned and wetted. Just prior to placing new concrete, horizontal surfaces and joints shall be slushed with at least 2 inches of cement grout of the same mixture as the concrete but with coarse aggregate omitted. Special care shall be used in placing and puddling concrete at vertical joints to ensure a bond with existing concrete. Vertical construction joints shall not be made in watertight construction, unless shown or approved in writing.

### W-5.23 Inserts and Sleeves

Pipes, anchor bolts, sleeves, steps, castings, floor drains, manhole frames, cast-in reglets, dovetail anchor slots, and other inserts shall be encased in concrete as shown. Special care shall be taken to place and maintain them to the proper lines and grades and to compact concrete thoroughly around them to prevent the passage of water. Insofar as possible, they shall be set before placing concrete and thoroughly braced to prevent movement during the progress of the work.

Water stops which may intersect such inserts and sleeves shall be miter jointed around them in a manner and location approved by the Engineer. Concrete placement shall follow the arrangement of the water stop.

All concrete walls faced with masonry shall have dovetail anchor slots spaced not more than 24 inches apart.

### W-5.24 Concrete Surfaces

All exposed interior and exterior concrete surfaces, the interior surfaces of cast-in-place concrete conduits, concrete tanks, channels, wet wells and other concrete water-holding or conveying structures shall be finished to achieve a neat and smooth appearance, except as otherwise shown or specified under the subsection headed "Architectural Finish."

Top edges of walls shall be finished with a ½-inch beveled edge, unless other details are shown, and any burr remaining upon removal of forms shall be rubbed off.

Immediately after stripping the forms, all concrete surfaces shall be inspected. All fins, offsets, burrs, ridges, or other unsightly marks shall be removed from the exposed concrete.

Tie holes, pour joints, voids, stone pockets, or other defective areas shall be patched before the concrete is thoroughly dry. Defective areas shall be chipped away to a depth of not less than 1 inch with all edges perpendicular to the surface. The area to be patched, including at least 5 inches of the adjoining surface, shall be wetted prior to placing the patching mortar. A grout of equal parts of cement and sand mixed to a brushing consistency shall then be scrubbed onto the surface, followed immediately by the patching mortar. The patch shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted. For exposed concrete, white cement shall be substituted for part of the gray cement so that the patch will match the color of the surrounding concrete. The proportion of white and gray cement shall be determined by making a trial patch. The amount of water shall be as little as consistent with requirements of handling and placing.

Mortar shall not be retempered. The mortar shall be thoroughly compacted and screeded off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of 1 to 2 hours to permit initial shrinkage before being finally finished. The patch shall be finished to match the adjoining surface and shall be cured as specified for the original concrete.

Except as otherwise shown or required, interior building and tunnel walls, exterior walls to 6 inches below finished grade, and all interior tank walls to 6 inches below normal liquid level shall receive an architectural finish.

#### W-5.25 Concrete Floor Surfaces

Concrete floor surfaces shall be monolithic with the structural slab and shall consist of the structural concrete, being finished as indicated in the following schedule, unless otherwise shown or as specified:

1. Tank bottoms and other surfaces not to be used as walkway areas - screeded, wood floated, steel troweled.
2. Tank bottoms to receive grout swept in by mechanisms - screeded, wood floated.
3. Exterior walkways and platforms over tanks to be used as walking areas - screeded, wood floated, steel troweled, broomed.
4. Exterior sidewalks - screeded, wood floated, divided into panels, steel troweled, broomed.
5. Interior working spaces such as screen rooms, motor rooms and pump rooms -

screeded, wood floated, steel troweled, chemically hardened.

6. Interior surface in areas to receive tile or carpeting such as offices, control rooms, toilet rooms and the like - screeded, wood floated, steel troweled.
7. Reservoir bottoms - screeded, wood floated.

Panels, where required, shall be approximately 10 feet square and constructed by using an edger to form dummy joints ¼-inch deep.

Troweled surfaces in decorative areas such as equipment rooms, offices, and the like shall be true planes within 1/8-inch in 10 feet. Other troweled surfaces shall be true planes within ¼-inch in 10 feet.

Where chemical hardening is required, the floor surface shall be thoroughly cleaned after it is completely cured, not less than 30 days after it is placed. It shall then be treated with at least two applications of floor hardener consisting of magnesium and zinc fluosilicate such as Lapidolith as manufactured by L. Sonneborn Sons, Inc. or Saniseal as manufactured by Master Builders Co., or equal, applied in accordance with the manufacturer's recommendations.

As an alternate to the above, where chemical hardening is required, a natural, nonmetallic aggregate surface hardener may be substituted, at the Contractor's option, at the time the floor is placed, in which case the latter application of chemical floor hardener may be omitted. The hardening shall be obtained by incorporating into the surface of the freshly floated concrete a dry shake of Master Builders Mastercron Pre-Mixed, Procron as made by Protex Industries, Inc. or equal, at the rate of 1/2 pound per square foot of floor surface. Preparation, application procedures, curing and precautions shall be performed in strict compliance with the manufacturer's recommendations and instructions and shall be submitted for approval prior to use.

Where brooming is required, the steel-troweled surface shall be broomed immediately after troweling. This brooming shall be just sufficient to leave marks without appreciably disturbing the troweled surface.

Where the floor surface is to be screeded by scraper mechanisms, the structural slab shall be finished as specified in the schedule, and a layer of grout placed thereon for final screeding by the mechanism.

All finished floors, walkways, and slabs shall be covered with boards, canvas, heavy paper or similar covering to protect them from damage.

#### W-5.26 Treads and Landings

Treads and landings of all exterior and interior concrete stairs shall receive a nonslip surface which is applied as an integral cement finish before the initial set of the slab has taken place, unless abrasive nosings or other finish is indicated. The finish shall consist of a ½-inch layer of stiff, thoroughly mixed mortar consisting of 1 part cement and 2 parts sand to which shall be added carborundum grit in the amount of 1/4 to 1/2 pound per square foot of finished surface. The mortar shall be screeded and troweled to a smooth and even surface.

#### W-5.27 Architectural Finish

All interior and exterior concrete surfaces exposed to view, including walls, columns, lintels, beams, underside of roofs, slabs, walks, stairs and like areas shall have an architectural finish. The interior surfaces of cast-in-place concrete conduits, concrete tanks, channels, wet wells and other concrete water-holding or conveying structures shall not have an architectural finish. The interior surfaces of such structures shall be finished as specified under the subsection headed "Concrete Surfaces".

Concrete with an architectural finish shall extend 6 inches below finish grade and have a smooth surface substantially free of air holes. Voids in the surface of 1/2-inch across or larger shall be patched and finished as specified hereinbefore under the subsection headed "Concrete Surfaces". All ridges and projections shall be ground smooth with the surface. Form joints shall be tight enough to prevent moisture loss and no departure from the plane shall be allowed between adjacent panels.

All tie holes left in exterior surfaces with an architectural finish shall be filled to within 1-inch of the concrete surface with nonshrink grout followed by caulking to within 1/2-inch of the surface, leaving an exposed recess. Caulking compound shall be of a color to match the cured concrete and shall be in accordance with the Workmanship and Materials section headed "Caulking and Sealing". Tie holes left in interior surfaces with an architectural finish shall be filled as specified under the subsection headed "Concrete Surfaces."

Finishing of surfaces resulting from the use of special form liners shall consist of the removal of burrs and other work required to produce a uniform appearance.

Surfaces to receive an architectural finish shall be saturated thoroughly with water and kept wet during the entire operation. A grout of 1 part portland cement and 1-1/2 to 2 parts fine sand shall be applied uniformly by a brush, plasterer's towel, or rubber float.

Immediately after applying the grout, the surface shall be vigorously floated with a wood, sponge rubber, or cork float to fill any small air holes. Excess grout shall then be scraped off with a sponge rubber float. If the float pulls grout from the holes, a sawing motion should be tried.

The grout remaining on the surface shall be allowed to stand undisturbed until it loses some of its plasticity but not its damp appearance. The surface should then be rubbed with clean, dry burlap to remove all excess grout. All air holes shall remain filled with no visible film of grout remaining after the rubbing. Any section being cleaned with grout shall be completed the same day.

If possible, work should be done during cool damp weather. During hot and dry weather, the concrete shall be kept moist with a fine fog spray during the sack finishing. The completed surface shall be moist cured by keeping the area wet the entire day following the operation. The architectural finish shall not begin until all defects have been repaired.

#### W-5.28 Grouting

Grout shall be placed under column setting plates, under equipment bases, in conjunction with the setting of anchors or dowels in holes drilled in concrete, and elsewhere as required.

Grout shall be a flowable, prepackaged, nonshrink grout without dependence on gas expansion forces or enlargement of metal particles for its nonshrinking characteristics. There shall be no shrinkage below placement volume under ASTM C 827 and no drying shrinkage under CRD-

C-621.

The Contractor shall furnish the Engineer with recent independent laboratory tests showing that the grout is nonshrink at various ages in accordance with CRD-C-621, shows no expansion after set (ASTM C 827), develops 3,000 psi with a trowelable mix within 24 hours (ASTM C 109), and has a placement time based on initial set of not less than 60 minutes (ASTM C 191). Test results shall be supplied showing that in projects of similar scope and size, the effective bearing area (EBA) shall be between 95 and 100 percent. Grout that contains water reducers, accelerators or fluidifiers shall have no drying shrinkage greater than the equivalent sand cement and water mix as tested under ASTM C 596.

Where grout will be exposed to the weather, it shall be free of discoloration without the necessity of special surface treatments. The grout shall be packed in moistureproof bags with general instructions for placement printed on the bag. All grout shall be mixed and placed in accordance with manufacturer's instructions. Technical service shall be supplied by manufacturer upon request.

#### W-5.29 Tunnel Grout

Grout for grouting around tunnel linings and other locations as specified or required shall be mixed in proportions of 1 part portland cement to 1 part sand by volume.

Nonshrink grout shall be mixed in the proportion of one part portland cement to one part sand by volume, to which shall be added a nonshrinking agent, Embeco as manufactured by the Master Builders Company, Cleveland, OH, Protalico as made by Protex Industries, Inc., or equal.

The nonshrinking agent shall be added in the proportions recommended by the manufacturer for the service intended.

Lean grout for backfilling the space surrounding the pipe sections in tunnels or other areas as specified or directed shall be mixed in the proportion of 1 part portland cement to 12 parts sand by volume.

#### W-5.30 Water Stops

Water stops shall be installed in construction joints on reglets cut into existing concrete work as shown or specified. Water stops shall be made of extruded polyvinyl chloride. Water stops shall be in accordance with the Workmanship and Materials section headed "Construction and Expansion Joints for Concrete".

#### W-5.31 Plastic Sheet Lining

Plastic sheet lining shall be installed in concrete conduits or structures as shown or specified. Plastic sheet lining shall be in accordance with the Workmanship and Materials section headed "Plastic Sheet Lining."

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SECTION 6 - REINFORCING STEEL

W-6.01 Standards

Reinforcing steel bars for concrete reinforcement shall be deformed bars meeting the requirements of ASTM Des: A 615, 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 A 185.

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 AWS D12.1. Thermitic 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.

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## SECTION 9 - STRUCTURAL AND MISCELLANEOUS STEEL

### W-9.01 General

Structural and miscellaneous steel shall include all ferrous metals, whether wrought, rolled, fabricated, or assembled, except castings, pipelines, and ornamental iron.

Columns, girders, beams, lintels, trolley beams, frames for openings and removable slabs, ladders, baffle supports, weirs and weir angles, nuts and washers, sheet piling, and similar work are included in this classification.

### W-9.02 Materials

Structural and miscellaneous steel shall meet the requirements of the following standards, except as otherwise shown or specified.

#### Structural Steel Shapes

Plates and Grating	ASTM A 36
Stainless Steel Plates	ASTM A 167 Type 304, No. 1 Finish
Stainless Steel Angles, bolting materials and other shapes	ASTM A 276 Type 304, No. 1 Finish
Rivet Steel	ASTM A 502
High Strength Bolts	ASTM A 325
Steel Sheet Piling	ASTM A 328
Silicon Bronze Bolting Materials	ASTM B 98, Alby A

### W-9.03 Workmanship

The design, workmanship, and erection shall conform to the requirements of the latest AISC Specifications for Design, Fabrication and Erection of Structural Steel for Buildings unless otherwise shown, specified, or required. The Contractor shall be solely responsible for the correctness of all shop and field fabrication and fit. Members shall be straight, shall fit closely together, and finished work shall be free from burrs, twists, bends, and open joints. Holes, connecting angles, supports and braces for stair stringers, equipment, apparatus, and similar work shall be provided where required. Structural plates and members for equipment, piping, and similar supports shall be 1/4-inch minimum thickness, unless shown or specified otherwise.

Where shop assembly of field connections is shown, specified, or required, unmatched holes shall be reamed and the pieces matchmarked before disassembly. No drifting will be allowed. In case the eccentricity is too great for good work or the strength of the joint is liable to be weakened by reaming, the piece shall be rejected and a new and satisfactory one shall be provided by the

Contractor at his own expense.

#### W-9.04 Connections in Field

Connections made in the field shall be welded or bolted as hereinafter specified unless riveted connections are approved by the Engineer.

#### W-9.05 Detailing

Completely detailed shop and erection drawings shall be submitted by the Contractor for approval. Working drawings will be approved for strength only. The numbering of columns, beams, and the like, as shown on detail and erection drawings, shall conform to the numbering shown on the Plans.

#### W-9.06 Welding

Welding shall be performed by certified welders holding current certificates in accordance with the requirements of the AISC, AWS, and ANSI standards. In assembling and during welding, the component parts of built-up members shall be supported and held by sufficient clamps and other adequate means to hold the parts in proper relation for welding. Welding at joints on weir plate appurtenances shall be watertight. Field welding on weir plates and appurtenances shall require prior written approval of the Engineer.

#### W-9.07 Bolted Connections

Bolted connections for structural framing shall be made with high strength bolts meeting the requirements of ASTM A 325.

All bolts shall be tightened by means of a torque wrench to the bolt tension recommended in Subsection 1.23.5 of the AISC Specifications.

#### W-9.08 Riveting

Rivets shall be driven by skilled workmen only and with pneumatic hammers. Rivet heads shall be full, tight, and concentric with the shank. No caulking or recupping will be permitted. Loose, burned, or defective rivets shall be cut out and replaced in a manner which will not injure the surrounding metal. Punching shall be done accurately, but small inaccuracies may be corrected by reaming. Riveted members shall be well pinned and firmly drawn together before riveting. Rivets shall be thoroughly and uniformly heated to not less than a bright red before driving. In removing loose, burned, or otherwise defective rivets, the oxyacetylene torch shall not be used.

#### W-9.09 Bolts and Nuts

Bolts and nuts other than those specified above for structural framing connections shall be of the best quality mild steel, except where bronze, aluminum, stainless steel, or other materials are shown or required. Bolts shall have hexagonal nuts. Threads shall be clean cut of the American

Standard size. Anchor bolts shall be accurately set, and if placed after concrete is poured, all necessary drilling and grouting shall be at the expense of the Contractor. Bolt anchors, unless shown or specified otherwise, shall be of the sizes indicated or approved and shall be Nations Lead Company "Cinch Anchor," Phillips "Stainless Steel Wedge Anchor," or equal.

All anchor bolts and nuts for equipment and items submerged or subject to periodic wetting shall be of stainless steel, unless other shown or specified.

#### W-9.10 Stud Anchors

Welded headed studs and stud anchors shall be provided in locations and of sizes and shapes shown as manufactured by Nelson Stud Welding or equal.

#### W-9.11 Sliding Plates

Sliding plates shall conform to ASTM B 147 (8B) and shall be "Lubrite Plates," manganese bronze No. 423, as manufactured by Merriman, Inc., or equal.

#### W-9.12 Steel Sheet Piling

Steel sheet piling shall have a minimum thickness of 3/8 inch in web and flange.

#### W-9.13 Painting

Structural steel shall be painted in accordance with the requirements of the Workmanship and Materials section headed "Painting." Stainless steel parts shall not be painted, but shall be wiped and rubbed clean of all foreign matter and left in a condition satisfactory to the Engineer.

\* \* \*

## SECTION 12 - PRECAST CONCRETE MANHOLES

### W-12.01 General

Manholes shall be constructed of precast reinforced concrete sections. Each manhole shall have a base section or tee section, barrel section, and an eccentric or concentric cone top, all as required. Manholes shall be built without steps. Except as otherwise specified or shown, precast concrete manholes shall comply with ASTM Des: C 478.

Manholes are classified as either Standard Deep Type Manholes, Standard Shallow Type Manholes, or Standard Drop Manholes. The maximum depths permitted for Standard Shallow Type Manholes and the locations where Standard Drop Manholes are to be used shall be as shown on the Plans.

Manhole barrel sections shall be constructed with preformed openings properly located for making sewer line connections. The diameter of such openings shall be not more than 4 inches larger than the outside diameter of the pipe or pipe bell to be connected. The distance between the nearest edge of such openings and the shoulder of the barrel joint shall be 6 inches minimum.

### W-12.02 Materials

Cement, sand, and water shall meet the requirements of the Workmanship and Materials section headed "Concrete Materials."

Brick shall meet the requirements of ASTM Des: C 32 Grade SM and shall have minimum dimensions of 2-1/4 inches by 3-1/2 inches by 7-1/2 inches. Brick shall be new, solid, sound, hardburned throughout, and uniform in size and quality.

Manhole frames and covers shall be of gray iron, shall meet the requirements of the Workmanship and Materials section headed "Metal Castings" and shall conform to the details shown on the Plans.

### W-12.03.1 Manholes on Sewers 24 Inches or Less in Diameter

Base sections for Standard Deep Type and Shallow Type Manholes shall consist of a circular slab base with a minimum thickness of 8 inches, and shall be reinforced as shown on the Plans. The base slab may extend beyond the outside diameter of the barrel section a maximum of 6 inches, providing the extension is equal at all points on the circumference of the slab. The manhole shall be set on not less than 6 inches of thoroughly compacted #57 stone.

Barrel sections for Standard Deep Type Manholes shall have an inside diameter of 48 inches plus or minus 1/2 inch and a minimum wall thickness of 8 inches plus or minus 2/5 inch. The minimum cover from the inside face of the wall to the reinforcement shall be 4-1/4 inches, and the minimum cover from the outside face of the wall to the reinforcement shall be 1-1/4 inches. The bottom section of manhole barrel shall be integrally precast with the manhole base section.

Top sections for Standard Deep Type Manholes shall be eccentric cones as shown on the Plans, with a minimum wall thickness of 8 inches plus or minus 2/5 inch. The minimum cover from

the inside face of the cone to the reinforcement shall be 4-1/4 inches, and the minimum cover from the outside face of the cone to the reinforcement shall be 1-1/4 inches.

Standard Drop Manholes shall comply with all applicable sections of the specifications for Standard Deep Type manholes and shall conform to the details as shown on the Plans.

#### W-12.03.2 Manholes on Sewers 27 to 42 Inches in Diameter

Base sections for Standard Deep Type and Shallow Type Manholes shall consist of a circular slab base, 5 feet or 6 feet in diameter as shown on the Plans, with a minimum thickness of 8 inches, and shall be T-Lok lined and reinforced as shown on the Plans. The base slab may extend beyond the outside diameter of the barrel section a maximum of 6 inches, providing the extension is equal at all points on the circumference of the slab. The manhole shall be set on not less than 8 inches of thoroughly compacted #57 stone.

Barrel sections for Standard Deep Type Manholes shall have an inside diameter of 48 inches plus or minus 1/2 inch, be T-Lok lined and a minimum wall thickness of 5 inches plus or minus 1/4 inch, and the minimum cover from the outside face of the wall to the reinforcement shall be 1-1/4 inches.

Top sections for Standard Deep and Shallow Type Manholes shall be a flat slab as shown on the Plans, with a minimum thickness of 10.5 inches and shall be T-Lok lined.

Standard Drop Manholes shall comply with all applicable sections of the specifications for Standard Deep Type manholes and shall conform to the details as shown on the Plans.

#### W-12.03.3 Manholes on Sewers 48 Inches or Greater in Diameter

Base sections for Standard Deep Type and Shallow Type Manholes shall be precast reinforced concrete pipe tees in the sewer lines as shown on the Plans. The run of each tee shall have the same diameter as the sewer and shall have the same joints. The run section shall conform to the requirements for Class V pipe, ASTM Des: C 76.

Barrel sections for Standard Deep Type Manholes shall have an inside diameter of 48 inches plus or minus 1/2 inch, T-Lok lined and a minimum wall thickness of 5 inches plus or minus 1/4 inch. The minimum cover from the inside face of the wall to the reinforcement shall be 1-1/4 inches, and the minimum cover from the outside face of the wall to the reinforcement shall be 1-1/4 inches. The bottom section of the manhole barrel shall be integrally precast with the manhole base section.

Top sections for Standard Deep Type Manholes shall be a flat slab, T-Lok lined as shown on the Plans, with a minimum wall thickness of 10.5 inches.

Standard Drop Manholes shall comply with all applicable sections of the specifications for Standard Deep Type Manholes and shall conform to the details as shown on the Plans.

#### W-12.04 Workmanship

Mortar shall be composed of one part cement to two parts sand.

Concrete for the base invert shall be Class D. The invert shall be constructed as shown in detail on the Plans and shall have a smooth channel with a circular shaped bottom with a radius equal to the inside radius of the sewer section.

Connections to pipes shall be without projections or voids. Connections to pipes shall be made with flexible type boot, cast integrally into the wall of the manhole and stainless steel bands, as detailed on the Plans, or equal.

Manhole sections shall be joined with rubber gaskets as specified for reinforced concrete pipe sewers, except that a preformed joint sealing compound, Waterstop-RX Cold Joint Water Stop, Volclay Waterproofing Systems as manufactured by American Collord Co.; Ram-Nek, manufactured by Hamilton-Kent, Kent, Ohio; or equal, be applied in accordance with the manufacturer's instructions. This may be substituted for the rubber gasket in manholes on sewers 42 inches or less in diameter. Sufficient preformed joint sealing compound shall be installed so as to completely fill the joint and show a "squeeze-out" on the inside and outside of the joint. Annular spaces on the inside and outside of joints with rubber gaskets shall be filled with mortar.

The elevation of the top rim of manhole frames shall be set to conform with grades and transverse slopes furnished by the Engineer. Precast concrete manhole components shall not be ordered until such elevations are issued by the Engineer. Manhole frames shall be firmly embedded in mortar. Wedges of shims shall be provided to ensure accurate placing of the frame.

#### W-12.05 Curing

All precast concrete manhole sections shall be cured in accordance with any one of the methods specified in ASTM Des: C 478. The facilities for curing shall, however, be subject to review and prior approval of the Engineer. No precast concrete manhole sections shall be delivered to the job site until the specified minimum compressive strength of 4,000 psi (6,000 psi in the case of manhole base sections on sewers 48 inches or larger in diameter), as determined by crushing tests on cured concrete cylinders, has been obtained.

#### W-12.06 Inspection and Testing of Precast Concrete Manholes

All precast concrete manholes shall be inspected by an independent, certified testing laboratory, approved by the Engineer, to establish the strength of the concrete and the adequacy of curing, to certify the date that the manhole were cast and to confirm that the steel has been properly placed, all in accordance with the Plans and Specifications. The cost of these tests shall be included in the various unit price Contract Items, and no special payment will be made therefor. This testing shall be performed by the laboratory at the Contractor's manufacturing plant, prior to shipment.

All concrete cylinders must be cured in a natural environment. At least three (3) cylinders shall be taken each day that manholes are cast, with batch samples to be designated by the laboratory

representative. At least one set of cylinders shall be taken for each 9 cubic yards of concrete used in the construction of the manhole sections. These samples shall be tested for strength. If the samples fail to meet minimum concrete strength requirements set forth in the Specifications, all manhole sections manufactured from the concrete from which the cylinders were made will be considered rejected.

In addition, the City reserves the right to core manholes either at the site or point of delivery to validate strength of concrete and placement of steel. If cores fail to demonstrate the required strength or indicate incorrect placement of reinforcing steel, all sections not previously tested will be considered rejected until sufficient additional cores are tested, at the Contractor's expense, to substantiate conformance to these requirements.

#### W-12.07 Transportation and Delivery

Every precaution shall be taken to prevent injury to the precast manhole sections during the transportations and unloading of the sections. The precast sections shall be unloaded using skids, pipe hooks, rope slings, or suitable power equipment, if necessary, and the sections shall be under perfect control at all times. Under no conditions shall the precast sections be dropped, dumped, or dragged.

If any precast section is damaged in the process of transportation, or handling, such section shall be rejected and immediately removed from the site and replaced at the Contractor's expense.

#### W-12.08 Test Reports

Each manhole delivered to the construction site must have a concrete test report indicating a minimum of 4,000 psi strength. If the manhole sections are produced from different pours, each section must have a concrete test report. Test reports must be submitted to the Engineer prior to shipment of the manholes.

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## SECTION 16 - RESTORATION OF STREET PAVEMENTS

### W-16.01 General

The various street surfaces disturbed, damaged, or destroyed during the performance of the work under this Contract shall be restored and maintained as shown, specified, and directed. Included in this classification are permanent pavement surfaces of all types, pavement bases, curb, curb and gutter, alleys, driveways, and sidewalks.

The quality of workmanship and materials used in the restoration shall produce a street surface equal to or better than the condition before the work began.

Service boxes, manhole frames and covers, and similar structures not conforming to the new work shall be set to established grade at the Contractor's expense, and no separate payment will be made therefor.

All portland cement and asphaltic concrete pavements shall be removed in rectangular sections with sawed vertical cuts, or to existing joints, as directed by the Engineer. Concrete pavements shall be cut with a concrete saw. Asphaltic concrete pavements one-inch thick or greater shall be cut with a tool having a square neat edge. The edges of adjacent pavement shall be trimmed to straight lines which a roller can follow. Where reinforced concrete pavement is removed, one foot of existing reinforcement on each side of the excavation shall be left exposed and tied to the replaced reinforcing steel.

The equipment necessary for the proper performance of pavement replacement shall be on the site in satisfactory working condition and shall be subject to approval of the Engineer before the work is started.

All replaced concrete pavements shall have a minimum bearing on undisturbed earth outside the line of excavations of at least nine (9) inches.

### W-16.02 Standards

The restoration of street pavement shall be performed in strict conformance with the standards relating to equipment, materials, and methods of construction of the authority having jurisdiction over the pavements, unless otherwise specified herein. Pavements to be restored are under the jurisdiction of the several agencies as follows:

1. State Highways are under the jurisdiction of the State of Florida Department of Transportation. Work on such pavements shall conform to the Department of Transportation Standard Specifications for Road and Bridge Construction.

2. City Streets are under the jurisdiction of the City of Tampa Department of Public Works. Work on such pavements shall conform to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, except that densities (including for subgrade) and other testing requirements shall follow current Department of Public Works specifications. The type and thickness of pavement, base and stabilization shall be as shown, specified, and directed by the Engineer.
3. County Roads are under the jurisdiction of the Hillsborough County Engineering Department. Work on such pavements shall conform to County specifications.

All specifications of the several agencies having jurisdiction over pavement restoration work shall be the current issue of such specifications as of the date of the "Notice to Bidders," except as specified otherwise herein.

#### W-16.03 Temporary Restoration

Upon completion of backfilling, the street or sidewalk surface damaged or destroyed shall be promptly placed in condition for safe temporary use. 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.

Where the area over which existing pavement has been disturbed is to be repaved as part of an overall project by the agency having jurisdiction, any special temporary pavement replacement shall be as specified in the "Specific Provisions."

Pavement surfaces shall be temporarily restored by placing thereon, to proper line, grade and transverse profile, a layer or layers of compacted base material, as specified, conforming to all requirements regarding configuration, thickness, and density as detailed in the Plans, specified, and directed by the Engineer. When the compacted thickness of the base layer is greater than 6 inches, the base shall be constructed in multiple courses. Each course shall not exceed 6 inches in compacted thickness. Where the existing pavement has a permanent wearing surface, the temporary pavement shall be finished with a suitable grade of asphalt and sand to provide a temporary wearing course and to eliminate dust nuisance.

Curbs, where possible, shall be temporarily reset in place, as part of the work of temporary restoration of pavement.

Damaged or destroyed sidewalks shall be temporarily restored, immediately upon placing of the backfill, by placing a compacted layer of fine crushed limestone, choked with limestone screenings, which shall have a minimum thickness of three inches below the existing finished sidewalk grade.

The temporary pavement shall be maintained by the Contractor and all holes and depressions filled until the permanent pavement is placed.

Limerock or shell placed in areas where the existing pavement is shell, limerock, crushed

stone, or other similar material and is classed as nonpermanent pavement, will not be measured for separate payment. Placement of limerock or shell as nonpermanent pavement replacement will be included for payment under the various classified Unit Price Contract Items for pipelines.

Temporary sand and asphalt wearing courses placed on base on which a permanent pavement surface will be constructed shall be incidental to the permanent pavement base work, and no separate payment will be made therefor.

Limestone screenings for temporary sidewalk surface shall be incidental to sidewalk replacement, and no separate payment will be made therefor.

Base material placed in areas to receive a permanent pavement surface will be measured for payment under the appropriate Contract Item for permanent pavement base.

#### W-16.04 Preparation of Temporary Pavement for Permanent Pavement Replacement

After due notice and within the time specified, the temporary pavement shall be prepared as the base to receive the new permanent pavement surface.

Prior to construction of the pavement base, the City will furnish the Contractor with the preconstruction survey notes for the streets disturbed by construction. The Contractor shall use these notes in bringing the base installed to grade allowing for the permanent pavement surface to be constructed.

The preparation of the base shall consist of bringing the area to be replaced to a grade conforming to the required grade and cross section, of uniform density, ready to receive the permanent pavement. This is to be accomplished by excavating or backfilling as needed, shaping, watering as required, or permitting to dry to proper consistency, and rolling the entire area with an approved self-propelled roller weighing not less than eight tons. Shaping and rolling shall be continued until the base has been properly prepared and shows that no further compaction of any practical benefit would result from continued rolling. The base shall be tested as to cross section, crown, and elevation. After being properly prepared, it shall be so maintained until the permanent pavement is constructed. Any part of the base area not accessible to the roller shall be thoroughly compacted by hand or by mechanical compaction in a manner acceptable to the Engineer. Preparation shall include sawing, cutting and trimming edges of existing pavements to provide a neat, uniform edge to abut the new pavement.

After completion of the base, the Contractor shall furnish the Engineer with survey notes verifying the base has been constructed to grade. Upon approval, payment will be made for permanent pavement base.

#### W-16.05 Certification for Pavement Base

The Contractor shall furnish notarized certifications from all suppliers of base material stating that all material supplied for use as pavement base conforms to the requirements of the applicable sections of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

W-16.06 Permanent Pavement Base Densities

Permanent base material shall be installed and compacted to the required densities (98% modified proctor) in layers not exceeding six inches.

W-16.07 Permanent Pavement Surface Restoration

Permanent restoration of pavement shall be pavement of the type and thickness detailed in the Plans, Specific Provisions, or as directed by the Engineer.

If the existing type of pavement is classified as nonpermanent pavement, the temporary restoration shall be reworked and completed and left in a condition at least equivalent to the existing nonpermanent pavement.

W-16.08 Replacement of Curb, Curb and Gutter, Sidewalk and Driveways

All permanent restoration of street curb or curb and gutter shall be of the same type and thickness as the curb or curb gutter which abuts. The grade of the restored curb and curb and gutter shall conform with the grade of the existing adjacent curb or curb and gutter.

Except as otherwise specified herein or detailed in the Plans, all permanent restoration of driveways and sidewalks shall conform to the manner of construction as originally placed and to the lines and grades as given by the Engineer. No patching of concrete driveway areas will be allowed between joints or dummy joints.

Where sidewalks are replaced, the replacement shall be the full width of the walk and minimum lengths shall be 60 inches. Restoration of adjacent lawn is incidental to sidewalk replacement, and no separate payment will be made therefor.

W-16.09 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 appurtenance 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 unit bid price for Permanent Pavement Surface Replacement, Asphaltic Concrete, and no separate payment shall be made therefor.

W-16.10 Hot Bituminous Mixtures (Section 330) Type S Asphaltic Concrete (Section 331)

This Subsection shall Replace and/or Modify Portions of F.D.O.T. Standard Specifications for Road and Bridge Construction (1991) Sections 330 and 331.

330-10.3 Density Control

330-10.3.1 Density Control Nuclear Method:

The in-place density of each course of asphalt mix construction, with the exceptions of patching courses, leveling and intermediate courses less than 1 inch thick or a specified spread rate less than 100 pounds per square yard, overbuild courses where the minimum thickness is less than 1 inch, and open-graded friction courses, shall be determined by the use of the Nuclear Density Backscatter Method as specified by FM 1-T238 (Method B). The required density of a completed course shall be at least 95% of the job mix design laboratory density submitted by the Contractor and approved by the construction engineer or 96% of the laboratory density which results from a sample of the same day's productions and determined by the City laboratory performing all acceptance testing.

330-10.3.2 Control Strips:

Control strips may be constructed by the Contractor for the purpose of determining the necessary pattern of compacting procedures to achieve the density requirements specified. However, control strips are not used for the validity of acceptance testing.

330-10.3.3 Lots:

For the purpose of acceptance and partial payments, each day's production will be divided into lots. The standard lot size shall be 500 linear feet and consist of one subplot with its appropriate test per every 100 linear feet of any pass made by the paving train, regardless of the width or thickness of the course being laid. Any partial lot will be redefined as a whole lot and the evaluation of it will be based on its subplot test determinations.

For the standard lot (500 linear feet), five density determinations - one for each subplot - will be made at random locations within the lot, but not to be taken within one foot of any unsupported edge.

For the Contractor to receive full payment for density, the average density of a lot will be a minimum of 95% of the submitted and approved job mix design laboratory density or 96% of the same day sampled laboratory density performed by the City laboratory performing acceptance testing. To calculate the average density of a lot, the lowest subplot test will be discarded and the remaining four sublots will be averaged. Once the average density of a lot has been determined, the Contractor will not be permitted to provide additional compaction to raise the average. The average density will be rounded off according to City standards.

330-10.3.4 Acceptance:

The completed pavement will be accepted with respect to density on a lot basis. Partial payment will be made for those lots that have an average density less than the specified 95% of the approved job mix design laboratory density or 96% of the same day sampled laboratory density based on the following table:

City of Tampa Revised Table 330-3  
Payment Schedule for Density

<u>Percent of Control Strip Density</u>	<u>Percent of Payment</u>
95.0 (job mix design) <sub>1</sub> or 96.0 (lab density sample) <sub>2</sub> & above	100
94.0 to < 95.0 <sub>1</sub> or 96.0 <sub>2</sub>	95
<u>Percent of Control Strip Density</u>	<u>Percent of Payment</u>
93.0 to < 94.0 (Applies to both <sub>1</sub> & <sub>2</sub> )	90
< 93.0 (Applies to both <sub>1</sub> & <sub>2</sub> )	75

330-10.3.5 Density Requirements for Small Projects:

For projects less than 500 linear feet in length including intersections, turnouts, patches, crossings, etc., the requirements for specified densities are the same as a standard lot. For the purpose of acceptance and partial payment determination, the project less than 500 linear feet will be considered as a lot in its entirety and payment will apply accordingly with Table 330-3. The Contractor will use standard rolling procedures in 330-10.

331-5 Acceptance of the Mixture

331-5.1 General:

The bituminous mixture will be accepted at the site with respects to a gradation and asphalt content on a lot to lot basis. The material will be tested for acceptance in accordance with the provisions of 6-8.2 and the following requirements. However, any load or loads of mixture which, in the opinion of the City representative, are found unacceptable for reasons of being excessively segregated, aggregates improperly coated, or of excessively high or low temperature shall be rejected for use in the work. The composition and physical test properties for all mixes must meet the specification ranges provided in Tables 331-1 and 331-2.

A standard size lot at the site shall consist of one day's placement or equivalent to a standard quantity of 1,000 tons. The number of samples required to evaluate the lot will be divided into one or two sublots as indicated below. Testing for acceptance of the lot will be performed by the City material testing laboratory or by a licensed private testing laboratory of the City's choice. Quantities between 500 tons and 1,000 tons shall have 2 sublots; quantities between 50 tons and 500 tons shall

have 1 subplot; quantities up to 50 tons will be accepted by the City representative on the basis of visual inspection.

### 331-5.2 Acceptance Procedures:

Sample selection for acceptance tests will be by random sampling of loaded trucks on site at the discretion of the City testing technician in accordance with FM-T168. The use of a random sample chart may be used but it is not required. Sampling shall not be taken in any of the following circumstances:

- 1) First load produced that day.
- 2) Last load produced that day.
- 3) Near end of quantity reached because of an underrun.

The Contractor and/or the plant quality control technician (Q.C.T.) will be notified of the time of sampling and may:

- 1) Observe the sampling.
- 2) Take a sample at the same time and run the tests.
- 3) Ask for a split sample and run the tests.
- 4) Observe the City testing technician run the tests.

The five acceptance determinations made from the sample are:

- 1) The % bitumen content per F.M.I. - T164.
- 2) The % passing the No. 4 sieve per F.M.I. - T030.
- 3) The % passing the No. 10 sieve per F.M.I. - T030.
- 4) The % passing the No. 40 sieve per F.M.I. - T030.
- 5) The % passing the No. 200 sieve per F.M.I. - T030.

For each acceptance sample taken, the technician will box and keep two split portions for referee tests. If the lot receives 100% payment, the referee sample will be discarded. If the lot sample shows a pay reduction, then one or both of the referee samples will be submitted for a second analysis to determine the validity of the acceptance test results. Referee samples will be tested by a licensed private laboratory of the City's choice. This second analysis will only be done at the request of the Contractor and will be paid for by the Contractor in the event that the original analysis results requiring a pay reduction is confirmed.

In the event that the second analysis does not confirm the pay reduction, the City will pay for the second analysis.

Acceptance of the mixture shall be on the basis of test results on consecutive random samples from each lot. One random sample shall be taken from each subplot. The bituminous mixture will be sampled at the site in accordance with FM 1-T168, except that samples may be collected from the paving machine at the receiving hopper. The percent bitumen content of the mixture will be determined in accordance with FM 1-T164 (as modified by DOT test procedures). The percents passing the No. 4, No. 10 and No. 200 sieves will be determined in accordance with FM 1-T030.

Calculations for the acceptance test results for bitumen content and gradation (percent pass No. 4, percent pass No. 10, percent pass No. 40 and percent pass No. 200) shall be shown to the nearest hundredth (0.01). Calculations for arithmetic averages shall be carried to the thousandths (0.001) and rounded to the nearest hundredth (0.01) in accordance with the Department's rules of rounding.

When the Contractor or producer chooses to use a storage bin for mix storage overnight or longer, the material processed in this manner will be sampled and tested for acceptance after the mix has been removed from the storage bin. The City representative may reject a mix at any time that is obviously defective due to asphalt content, insufficiency of mixing, inadequacy of coating, improper proportions of fine and coarse aggregates, temperature, contamination, etc. The Contractor and/or the L.Q.C.T. will be given the option of not placing the mix and sampling the following truck, or if it has been placed, sample it. The City reserves the right to test or have the mix tested by a licensed private testing laboratory of their choice. Payment will be made on the basis of the City's revised Table 331-6 "Acceptance Schedule of Payment."

City of Tampa Revised Table 331-6  
 Acceptance Schedule of Payment  
 (Asphalt Plant Mix Characteristics)

Deviation of the Arithmetic Average of the  
 Lot Acceptance Tests from Job Mix Formula

<u>Characteristics</u>	<u>Factor</u>	<u>One Test</u>	<u>Two Tests</u>
Asphalt Cement Content (Extraction)	1.00	0.00 - 0.55	0.00 - 0.43
	0.95	0.56 - 0.65	0.44 - 0.50
	0.90	0.66 - 0.75	0.51 - 0.57
	0.80*	Over 0.75	Over 0.57
No. 4 Sieve**	1.00	0.00 - 8.00	0.00 - 5.95
	0.95	8.01 - 9.00	5.96 - 6.66
	0.90	9.01 -10.00	6.67 - 7.36
	0.80	Over 10.00	Over 7.36
No. 10 Sieve**	1.00	0.00 - 6.50	0.00 - 5.04
	0.95	6.51 - 7.50	5.05 - 5.74
	0.90	7.51 - 8.50	5.75 - 6.45
	0.80*	Over 8.50	Over 6.45
No. 40 Sieve**	1.00	0.00 - 5.50	0.00 - 4.62
	0.95	5.51 - 6.50	4.63 - 5.33
	0.90	6.51 - 7.50	5.34 - 6.04
	0.80*	Over 7.50	Over 6.04
No. 200 Sieve**	1.00	0.00 - 2.00	0.00 - 1.71
	0.95	2.01 - 2.40	1.72 - 1.99
	0.90	2.41 - 2.80	2.00 - 2.04
	0.80*	Over 2.80	Over 2.04

\* If approved by the City, the Contractor may accept the indicated partial pay. The City may require removal and replacement at no cost. The Contractor has the option to remove and replace at no cost to the City at any time.

\*\* When there are two or more reduced payments for these items in one lot of material, only the greatest reduction in payment will be applied. CAUTION: This rule applies only to these four gradation test results.

- Note: 1) The No. 40 sieve applies only to Types S-I, S-II, S-III, FC-1, and FC-4.  
 2) Deviations are absolute value with no plus or minus signs.

\* \*

SECTION 20 - MAINTAINING EXISTING SANITARY SEWER IN OPERATION

W-20.01 General

It shall be the Contractor's responsibility to preserve all existing sanitary sewer services without interruption while performing the work included in this project. The Contractor shall furnish all labor, materials, and equipment required to bypass wastewater flow around the working area to an acceptable point of discharge. Also, if deemed necessary by the engineer, the contractor will be responsible to provide necessary noise suppression devices to minimize bypass pumpnoise.

The Contractor shall not be permitted to pump or otherwise direct the flow of sanitary sewage into storm sewers, streams, or other open channels or onto streets or alleys at any time during the course of the work.

W-20.02 Bypass Pumping

The Contractor shall submit the proposed plan to the Engineer for approval prior to proceeding with the work. All required agency approvals and permits shall be the responsibility of the Contractor. The hydraulic design of the bypass pumping arrangement shall be the sole responsibility of the Contractor.

Pumping equipment shall be of a type suitable for pumping raw unscreened sewage over an indefinite period without clogging or requiring shutdown for routine maintenance. Bypass pumping shall be continuous during the entire length of time each portion of the work is being accomplished. The Contractor shall submit drawings and equipment specifications, detailing the proposed pumping equipment and the method of installation, to the Engineer for approval.

The Contractor shall possess at least one (1) backup pump, no smaller than the largest pump in use, on site for every 1 to 3 bypass pumps in operation. An additional backup pump shall be required on site for each increment of 3 pumps in operation as illustrated on the following table:

<u>Operating Bypass Pumps</u>	<u>Required Backup Pumps On Site</u>
1 - 3	1
4 - 6	2
7 - 9	3

W-20.03 Connections

All house laterals and connections to lateral sewers shall be maintained in operation without leakage or backup during the work.

W-20.04 Street Closures

The Contractor shall be responsible for coordination of maintenance of traffic and all street closures with the City of Tampa, Department of Public Works; Hillsborough County, Superintendent of Maintenance; and the State of Florida, Department of Transportation.

\* \* \*

## SECTION 27 - DEMOLITION

### W-27.01 General

Demolition includes all work necessary for the removal and disposal of masonry, steel, reinforced concrete, 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.

### 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 30 - MISCELLANEOUS PIPE AND FITTINGS

### W-30.01 General

Miscellaneous pipe and fittings include polyvinyl chloride (PVC) pipe, copper pipe, steel pipe, and plastic tubing.

### W-30.02 Polyvinyl Chloride Pipe

Polyvinyl chloride (PVC) pipe shall be Schedule 80 minimum meeting the requirements of ASTM Des: D 1785, 1254B. All joints and fittings shall be threaded except where flanged joints are shown or required for connection to other piping. Threaded PVC fittings shall be socket welding type, 150-pound class, conforming to ASTM Des: D 2467 and D 2657.

### W-30.03 Copper Pipe

Copper pipe shall be Type K or L hard-drawn copper tubing and shall meet the requirements of ASTM Des: B 88.

Fittings shall be of the streamlined, solder joint type, and shall meet the requirements of ANSI Specifications B16.22.

### W-30.04 Steel Pipe

Steel pipe shall be galvanized, meet the requirements of ASTM Des: A 53 and shall not be less than Schedule 40. Dimensions of steel pipe shall conform to ANSI B36.10.

Fittings for steel pipe shall be galvanized and shall be made to standard dimensions or as shown. Fittings used in pipelines 2 inches in diameter or smaller shall be of the screwed pattern and shall be of malleable iron meeting the requirements of ASTM Des: A 197. The fittings shall conform to ANSI B 16.3. Where galvanized fittings are shown or specified, galvanizing shall meet the requirements of ASTM Des: A 120. Steel flange fittings shall meet the requirements of ANSI B 16.5 for 150-pound standard, except that the flanges shall be plain faced.

All flanges for steel pipe, except blind flanges, shall be of the slip-on welding type with hubs meeting the requirements of AWWA C207 Class B, D, or E suitable for the size of pipe and test pressures specified, and conforming to the requirements of ASTM Des: A 181, Class 1. The flanges shall be attached to the barrel of the pipe with two continuous fillet welds. The flanges shall be attached to the barrel of the pipe with two continuous fillet welds. Blind flanges shall be plain faced and shall conform to ANSI B 16.5, Class 150. All flanges shall be covered and protected during delivery and storage.

Flanged joints shall be made with bolts or bolt studs with a nut on each end. Bolts, stud bolts, and nuts shall meet the requirements of ASTM Des: A 307, Grade B and ANSI B 16.1 unless noted otherwise on the Plans.

Gaskets for flanged joints shall be of rubber with cloth insertion of the full face type meeting the requirements of ANSI B 16.21 and shall be those made by the Garlock Packing Company, Crane Company, U.S. Rubber Company, or equal. Gaskets shall be 1/16 inch thick.

Zinc for galvanizing, zinc coating, and plating shall meet the requirements of ASTM Des: B 6 and shall be at least equal to the grade designated as "Prime Western."

Wrought metals and castings shall be sandblasted or ground smooth. When a smooth coat is required, castings shall be tumbled and all high spots ground flush. Castings shall be normalized to prevent cracking.

Base metal shall be thoroughly cleaned, using only approved solvents and wire brushes, after which it shall be pickled.

Products to be galvanized shall be safeguarded against embrittlement in accordance with ASTM Des: A 143 and against warpage and distortion in accordance with ASTM Des: A 384.

Galvanizing shall be done by the hot-dip process after fabrication, unless otherwise specified in conformance with the appropriate ASTM and American Hot Dip Galvanizers Association, Inc. specifications. The dipping shall not come in contact with or rest upon the dross during the operation.

Galvanizing and coating shall be done in a plant having sufficient facilities to produce the quality of coatings herein specified and ample capacity for the volume of work required. Galvanized material shall be shipped and handled in a manner which will avoid damage to the zinc coating.

Galvanizing shall meet the requirements of ASTM Des: A 120.

#### W-30.05 Plastic Tubing

Plastic tubing for the air supply line shall be clear vinyl instrument grade tubing with an inside diameter of 3/8 inch and a minimum wall thickness of 0.062 inch. The tubing shall be FAST & TIGHT, Formula PV-2 as manufactured by Parker Hannifin, Kent, Ohio, or equal.

#### W-30.06 Workmanship

Working drawings, delivery, erection, testing, insulation, and disinfection of miscellaneous pipe and fittings shall meet the applicable portions of similar requirements for ductile iron pipe specified under the respective sections of Workmanship and Materials.

\* \* \*

SECTION 31 - HANGERS AND SUPPORTS

W-31.01 General

Hangers and supports shall include all hanging and supporting devices of metallic construction shown, specified, or required for pipelines, apparatus, and equipment other than electrical equipment. The Contractor's working drawings, as required by the General Provisions hereof, shall show the quantity, type, design, and location of all hangers and supports required.

W-31.02 Materials

Structural and miscellaneous steel, iron castings, cast-iron pipe, and steel pipe used for hangers and supports shall meet the requirements of the applicable Workmanship and Materials sections.

W-31.03 Design

Hangers and supports not detailed on the Drawings shall be adequate to maintain the pipelines, apparatus, and equipment in proper position and alignment under all operating conditions with due allowance for expansion and contraction, and shall have springs where necessary. Hangers and supports shall be of standard design where possible, and be best suited for the service required, as approved by the Engineer. Where required, they shall be screw adjustable after installation.

Supporting devices shall be designed in accordance with the best practice and shall not be unnecessarily heavy. Sufficient hangers and supports shall be installed to provide a working safety factor of not less than five for each hanger.

All supporting devices shall be designed as to minimize interference with access and movement. The injury hazard shall be considered and minimized in all protruding supporting devices.

On pipes which are covered with heating insulation, hangers and supports shall include proper pipe protection saddles.

Overhead hangers shall be supported by threaded rods properly fastened in place by suitable screws, clamps, inserts, or bolts, or by welding.

Brackets for the support of piping from walls and columns shall be made of welded steel and shall be designed for three maximum loads classified as follows:

Light . . . . .	750 pounds
Medium . . . . .	1,500 pounds
Heavy . . . . .	3,000 pounds

When medium or heavy brackets are bolted to walls, backplates of adequate size and thickness shall be furnished and installed to distribute the load against the wall. When the use of backplates is not practicable, the brackets shall be fastened to the wall in such a manner that the safe bearing strength of the wall will not be exceeded.

Pipe rolls or chairs shall be of the cast-iron type. Pipe rolls shall be provided with threaded nuts or with sockets to take threaded rods.

Saddle stands shall be of the adjustable type. Each stand shall consist of a length of steel pipe fitted at the base with a standard threaded cast-iron flange and at the top with an adjustable saddle or roll. The base flanges shall be bolted to the floor foundation or concrete base.

Stanchions shall be of similar construction to the saddle stand, except that they shall be fitted at the top with cast-iron pipe saddle supports or with pipe stanchion saddles with yokes and nuts.

Where adjustable supporting devices are not required, pipelines 3 inches in diameter and smaller may be supported on cast-iron, malleable iron, or steel hook, hook plates, rings, or ring plates.

#### W-31.04 Anchors

Anchors shall be furnished and installed when specified, shown, or required for holding the pipelines and equipment in position or alignment. Anchors shall be designed for rigid fastening to the structures, either directly or through brackets. The design of all anchors shall be subject to approval by the Engineer.

Anchors for piping shall be of the cast-iron chair type with steel straps, except where anchors form an integral part of pipe fittings or where an anchor of special design is required.

#### W-31.05 Inserts

Inserts for concrete shall be galvanized and shall be installed in the concrete structures where required for fastening supporting devices. They shall be designed to permit the rods to be adjusted horizontally in one place and to lock the rod nut or head automatically. Inserts shall be recessed near the upper flange to receive reinforcing rods. Inserts shall be so designed that they may be held in position during concrete placing operations. Inserts shall be designed by the rod which they engage.

#### W-31.06 Painting

Hangers, supports, anchors, and similar devices shall be painted in accordance with the Workmanship and Materials section headed "Painting."

\* \* \*

## SECTION 32 - VALVES

### W-32.01 General

This section includes plug valves, check valves and combination air vacuum and air release valves. Plug valves for buried application shall be provided with mechanical joints. Plug valves, check valves and air vacuum valves shall be provided with flanged connections. 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, Val-matic Series 500, or equal of the rubber flapper, horizontal, swing type designed to allow full diameter passage and to operate with a minimum loss of pressure.

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 Eccentric Plug Valves

Plug valves shall be of the eccentric valve design for not less than 100 psig water, oil, or gas operating pressure; stainless steel bearings that do not require lubrication, bolted bonnet, resilient faced eccentric plug which moves into raised eccentric seat from open to closed position and provides dead-tight shutoff; cast iron body conforming to ASTM A 126 Class B with welded-in nickel seats, straight through flow with port area a minimum of 80% of pipe area and accessibility to multiple packing rings without disassembly of the valve, wrench operated to 8-inch, gear operated 10-inch and larger, chains and chain wheels 7 feet or more above a floor. Valves shall be Val-matic Series 5800, or equal.

W-32.05 Ball Valves for Air Release Valve Steel Piping

Manually operated ball valves for steel piping shall meet the following:

Rating	500 psi [3.4 MPa] 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	Threaded End
Temp. Limitations	-20 to 400°F [-29 to 204°C]
Valve Operator	Lever
Manufacturers	Conbraco Industries "Apollo 77-100 Series"; Powell "Fig 4210T"

W-32.06 Combination Air Vacuum and Air Release Valves

Provide combination surge check, air vacuum and air release valve as shown on the Plans. Provide valves fabricated and assembled in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer. Furnish valves with all necessary parts and accessories indicated on the drawings, specified, or otherwise required for a complete, properly operating installation and which are the latest standard products of a manufacturer regularly engaged in the production of valves.

Except as modified or supplemented herein, all valves furnished under this section shall conform to the applicable requirements of AWWA C512.

Provide complete assembly drawings, together with detailed specifications and data covering materials used and accessories forming a part of the valves furnished.

Provide an air valve assembly that consists of a globe style surge check valve mounted to the inlet of an air vacuum valve. The surge check valve shall minimize water hammer. The air vacuum valve shall allow entry of large quantities of air under vacuum conditions and shall exhaust large quantities of air. A separate air release valve shall be piped from the body of the air vacuum valve to exhaust small quantities of air that may accumulate during operation. The maximum pressure at which the valves shall operate is approximately 40 feet. In addition, on pump shut-off, the air valve assembly will drain until pumps are restarted. Provide appropriate elastomers and design to accommodate the relatively low pressure and suitable for prolonged air exposure.

Provide an anti-slam surge check valve on the inlet to the air/vacuum valve that will allow free air flow in and out of the valve, close upon water entry and control the water entry velocity to reduce valve pressure surges. Provide a flanged, globe-pattern and spring-operated unit with a center-guided stainless steel disk and seat assembly. Provide for replacement of the resilient seat

without removing the valve cover. Provide threaded holes in the disk to provide adjustment to the water flow rate through the valve. Provide a stainless steel spring assembly to hold the disc open during high flow conditions and allow the disc to close upon water entry. Construct the anti-slam check valve body of the same materials as the air/vacuum valve.

The air and vacuum valve shall consist of an externally mounted air release valve with a dome cover over the vacuum breaker and ¼-inch stainless steel insect screen. The valves shall be Apco/Valve and Primer "Custom Combination Air Valves", GA Industries "Figure 950 Kinetic Custom Combination Air Valves", Multiplex "Crispin Dual Air Valves", or Val-Matic "Dual Body Combination Air Valves".

The externally-mounted one-inch air release valves shall be APCO/Valve and Primer "No. 200", GA Industries "Figure 920m", Multiplex "Crispin Type PL", or Val-Matic "No. 38".

Materials of construction shall comply with the governing standard. The use of stressed thermoplastic components will not be acceptable.

Valve Trim	Bronze or austenitic stainless steel.
Float	Austenitic stainless steel.
Shop Coatings	
Epoxy	Carboline "Carboguard 891" or Tnemec "Series N140 Pota-Pox Plus."
Rust-Preventive Compound	As recommended by manufacturer.

Shop coat all interior and exterior ferrous metal surfaces, except stainless steel components, with a coating that is NSF 61 certified. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field coating. Field paint in accordance with the painting specification.

Surfaces shall be painted as indicated:

Interior Surfaces	NSF-61 rated epoxy.
Exterior Surfaces	Universal primer.
Polished or Machined Surfaces	Rust-preventive compound.

Interior epoxy coatings shall comply with AWWA C550 and shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

Type of Coating	Minimum Dry Film Thickness
Epoxy	10 mils
Universal Primer	3 mils

The piping that connects the force main to the air release/air vacuum valve assemblies shall be ductile iron pipe equipped with a flanged plug valve, per the detail shown on the Plans. The air release valve is separate from the air/vacuum valve and shall be Schedule 40 galvanized steel pipe and fittings, painted exterior coating, and provided with a bronze ball shutoff valve between the air and vacuum valve and the air release valve.

W-32.07 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-32.08 Painting and Coating

The exterior of buried plug valves shall receive the following coating system:

- a) Shop Coat - One, 1.5 mils, MDFT, Sikagard #62 (thinned 10-15%), or equal.
- b) Field Coat - Two coats, 10 mils MDFT each, Sikagard #62, No. 300M, or equal.

The exteriors of plug and check valves and the interior iron or steel interior surfaces of plug and check valves shall be factory coated in accordance with Section 09901, Painting Process Mechanical and Electrical Work.

\* \* \*

## 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 2% 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.

<b>COATING SCHEDULE</b>					
<b>Surfaces</b>	<b>SHOP COAT</b>	<b>Primer</b>	<b>Coats</b>		
			<b>1ST</b>	<b>2ND</b>	<b>3RD</b>
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 Nonsubmerge d		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**

<b>Symbol</b>	<b>Product Name and Number</b>	<b>Minimum Dry Film Thickness Mils per Coat</b>
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	4.0 - 6.0
	Grade) Tnemec Series 446 Perma-Shield	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 47 - CONTROLS

### W-47.01 General

Control components shall comply with the latest ANSI, IEEE, and NEMA standards where applicable.

Maximum control voltage shall be 120 VAC, 60 Hertz.

Control devices shall be of industrial grade, heavy-duty design, utilizing modular construction to increase flexibility.

### W-47.02 Switches and Push Buttons

Switches and push buttons shall be heavy-duty, oil-tight, watertight, NEMA Type 4X, corrosion resistant units intended for industrial applications. The operator shall mount in a 1.20-inch diameter opening and be provided with the proper legend plate.

Switches and push buttons shall be as manufactured by Square D, General Electric, Allen-Bradley, or equal.

### W-47.03 Pilot Lights

Pilot lights shall be heavy-duty, oil-tight, NEMA Type 4X, corrosion resistant, push to test, 120 VAC light emitting diode (LED) type, and intended for industrial applications. The operator shall mount in a 1.20-inch diameter opening and be provided with the proper legend plate and lens color.

Pilot lights shall be as manufactured by Square D, General Electric, Allen-Bradley, or equal.

### W-47.04 Circuit Breakers

Circuit breakers shall be of the molded case, air-break type designed for 600 volt, 60 Hertz service or as shown on the Drawings. They shall have both thermal and magnetic elements on all three poles. These elements will actuate a common tripping bar to open all poles when an overload or short circuit occurs.

The circuit breakers shall have an AIC rating greater than the available fault current at the panel.

The equipment shall be as manufactured by Square D, General Electric, Cutler-Hammer or equal.

#### W-47.05 Industrial IEC Relay

Industrial Control Relays shall match the units used in the existing pump control panel and shall have the following features:

1. conform to IEC 947-5-1 and IEC 377-1 standards
2. 120 VAC, 60 Hertz, 6.3 VA nominal, coil.
3. four-pole— two (2) N.O. and two (2) N.C. bifurcated contacts rated 6.0A at 120VAC
4. availability of two and four pole adder decks, timers, and accessories for field installation
5. modular construction with replaceable coils
6. guarded contacts with retained visibility for protection and ease of wiring
7. clearly visible terminal markings
8. surface or DIN rail mounting
9. mechanical life of 20 million operations

The industrial control relay shall be Allen Bradley, model 700-F220A1 with adder decks as required.

#### W-47.06 General Purpose Control Relays

Relays for general control switching applications shall have the following features:

1. 120 VAC, 60 Hertz, 2 VA nominal, coil.
2. Two (2) Form C (2PDT), 10 ampere, silver-cadmium oxide contacts.
3. Eight pin octal-type plug (provide matching screw terminal sockets).
4. Clear, high-impact polycarbonate dust cover.

The control relay shall be Potter & Brumfield KRPA-11AG-120 with 27E122 socket, or equal.

#### W-47.07 Instrumentation Signal Multicontact Relays

Relays for switching instrumentation level signals shall have the following features: 120VAC coil; 4PDT gold-flashed silver, gold-silver nickel, or gold bifurcated crossbar contacts; socket mount; sealed plastic cover; and hold-down spring.

The contact ratings shall exceed the requirements for the application, and shall be no less than 1 Amp at 120VAC. The expected life shall be a minimum of 100,000 operations at rated load.

The socket shall be of the surface or rail-mount design with screw terminals to facilitate circuit connections.

The relay and socket shall be Omron model MYQ4, or equal.

W-47.07 Elapsed Time Meters

Elapsed time meters shall be furnished and installed where shown. Time meters shall register up to 9999.9 hours, be non-resetable, have square cases suitable for panel mounting, and have coils for 120 volt, 60 Hertz operation. The units shall be as manufactured by Eagle Signal, Crammer, or equal.

W-47.08 Surge Protection Device (SPD)

The SPD shall be able to suppress lightning induced voltage surges three times greater than the industry standards. The rated line voltage for SPD shall be 480 VAC, 3-phase 3-wire delta. The maximum single impulse current shall be 100kA per phase.

1. The SPD shall have line to neutral protection on all phases, and also neutral to ground protection.
2. The SPD shall have a 5 year warranty. Under that warranty, the SPD shall be replaced if it is destroyed by lightning or other impulses.
3. The SPD shall have an LED failure indicator on all three phases.
4. The clamp voltages for the SPD shall be the following:

Line to neutral - 700 volts  
Line to ground - 700 volts  
Neutral to ground - 700 volts  
Line to line - 1200 volts

The SPD shall be Advanced Protection Technologies model TE05XDS104X, or equal.

W-47.09 Panel Mount Terminal Blocks

Control terminal blocks shall be single pole units constructed of a thermo-set phenolic base with wire clamp terminals attached. The terminals shall be rated for 25 amps, 600 volts. The terminals shall accommodate #16 to #12 AWG conductors. The block shall have a dovetail base that facilitates joining of the blocks into a rigid, self-supporting assembly.

The terminal blocks shall be as manufactured by Allen Bradley, Square D, or equal.

W-47.10 Control Transformers

The control transformer shall be a single output type for primary and secondary voltages as shown. Primary and secondary protection fuse blocks shall be prewired and mounted on top of the transformer. The secondary side neutral leg shall be grounded. The control transformer shall have sufficient capacity to provide the energy demands for all connected control components. They shall be designed with low impedance windings for excellent voltage regulation, and shall accommodate the high inrush current associated with contactors, starters, solenoids, relays and other connected devices. The control transformers shall be designed for a 55°C temperature rise at full load.

The electrical performance shall exceed the requirements of ANSI/NEMA ST-1 (Specialty Transformers). The transformers shall be as manufactured by Square D, General Electric, Cutler-Hammer, or equal.

W-47.11 Vibration Transmitters

The Vibration Transmitter shall be 2-channel to allow for monitoring of both pump and motor vibration.

Vibration Transmitter shall be provided with fiberglass enclosure and be powered by a single 120V source.

Vibration Transmitter shall be as manufactured by Connection Technology Center, Inc. (CTC), VP series, Model #VPR100-2L-V0-BB.

Accelerometers shall be 100mV/g type, CTC Model #AC102 with appropriate cable and connectors.

\* \* \*

## SECTION 52 - MANHOLE AND STRUCTURE REHABILITATION

### W-52.01 General

It is the intent of this specification to provide for the rehabilitation of the existing brick and concrete manholes, junction chambers and structures shown on the drawings, specified and directed by the Engineer. The rehabilitation shall consist of a spray applied 100% solids epoxy system, or urethane resin system, as specified herein. All aspects of the rehabilitation shall be done in strict accordance to the manufacturer's instructions.

It is the Contractor's responsibility to comply with OSHA standards and all regulations pertaining to work in confined space entry.

### W-52.02 Submittals

Prior to the commencement of any rehabilitation work, the Contractor shall submit the following to the Engineer for approval:

- 1) A rehabilitation plan detailing the methods, materials and procedures proposed for the rehabilitation of all manholes and junction chambers.
- 2) Mortar and hydraulic cement mix designs detailing the compressive strengths, cement/water ratios, slump, etc.
- 3) Written certification by the protective coating manufacturer stating that the proposed repair material is compatible and acceptable as a substrate for the protective coating to be applied.
- 4) Detailed method of complete containment of debris
- 5) Description of all the equipment to be used for the rehabilitation.
- 6) Safety plan describing all safety equipment to be utilized in compliance with OSHA standards pertaining to work in confined space entry.

### W-52.03 Surface Preparation

Surface preparation shall be in strict accordance with the approved coating manufacturer's instructions. All surfaces to be coated shall be cleaned with a high pressure water spray (minimum 5000 psi). The use of acid for cleaning purposes will not be allowed. All deteriorated concrete and loose or protruding brick and mortar shall be removed from the wall and benches in order to obtain a smooth and even substrate suitable for the proposed coating system. Surfaces shall be cleaned and abraded to produce a sound and uncontaminated surface with adequate profile and porosity to provide a strong bond between the proposed material and the substrate. All corroded materials shall be disposed of at an off-site location in accordance with all Federal, State, and local regulations. All infiltration shall be stopped with hydraulic cement or other approved means before installation of the coating system. Any voids in the manhole walls shall be sealed with hydraulic cement.

Repair materials shall be applied in strict accordance with the manufacturer's instructions and shall be finished as recommended by the protective coating manufacturer. At minimum, the repair material shall be troweled or brushed to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating.

The Contractor shall install bulkheads or plugs in order to prevent extraneous material from entering the sewer lines.

W – 52.05 Epoxy Coating System

The sprayed applied epoxy coating system shall be as manufactured by Raven Lining Systems, Broken Arrow, Oklahoma, or equal. The product shall be a 100% solids, solvent-free ultra high-build epoxy. The finished epoxy shall be resistant to sulfuric acid attack associated with domestic sewage. The epoxy shall be manually sprayed onto the structures or manholes to provide a uniform smooth and even surface.

The minimum finished thickness shall be as specified on the plans. The coating system shall be capable of being applied over wet surfaces without degrading the final product.

The existing manhole and junction chambers shall be prepared for the application of the epoxy system by cleaning and stoppage of infiltration as specified above. Prior to applying the epoxy liner, the entire manhole surface and benches shall be patched and grouted to the extent needed to provide a smooth and even surface to which the liner will adhere.

The cured epoxy system shall conform to the minimum physical standards, as listed below:

<b>CURED EPOXY</b>	<b>STANDARD</b>	<b>LONG-TERM DATA</b>
TENSILE STRENGTH	ASTM D-638	7,500 psi
FLEXURAL MODULUS	ASTM D-790	600,000 psi
FLEXURAL STRESS	ASTM D-790	13,000 psi
COMPRESSIVE STRENGTH	ASTM D-695	18,000 psi

The Contractor shall provide certified independent, third party test results verifying the minimum physical properties listed above. The tests shall be in conformance with the ASTM specifications listed.

The finished liner shall be cured in strict accordance with the manufacturer’s instructions.

Composite systems containing layers of different materials or cured-in-place resin systems that are inflated in the manholes will not be considered as equal.

W- 52.06 Epoxy Paste (Fast Curing and Moisture Tolerant Coating)

The epoxy paste shall be a two-component moisture tolerant, high adhesive 100% solid strength epoxy paste. The epoxy paste shall be a Concrete Polymer Paste (CPP) as manufactured by EpoxyTec or approved equal. The coating shall be capable of curing underwater and shall be trowel applied up to 1.5-inches thick without sag.

Concrete surfaces shall be prepared for the application of the epoxy paste by cleaning and stoppage of infiltration as specified above. Prior to applying the epoxy paste, concrete surfaces shall be repaired to the extent needed to provide a smooth and even surface to which the liner will adhere.

The epoxy paste shall conform to the minimum physical standards, as listed below:

<b>CURED RESIN</b>	<b>STANDARD</b>	<b>LONG-TERM DATA</b>
TENSILE STRENGTH	ASTM D-638	8,900 psi

FLEXURAL STRESS	ASTM D-790	8,020 psi
FLEXURAL MODULUS	ASTM D-790	720,000 psi

The tensile bond to wet concrete shall be a minimum 525 psi. The Contractor shall provide certified independent, third party test results verifying the minimum physical properties listed above. The tests shall be in conformance with the ASTM specifications listed.

The finished liner shall be cured in strict accordance with the manufacturer’s instructions.

W-52.07 Urethane Resin System

The sprayed applied urethane resin system shall be SprayWall as manufactured by Sprayroq, Inc, Birmingham, Alabama or equal. The finished urethane shall be resistant to sulfuric acid attack associated with domestic sewage. The urethane shall be manually sprayed onto the structures or manholes to provide a uniform smooth surface. The minimum finished thickness shall be as specified on the plans. The coating system shall be capable of being applied over wet surfaces without degrading the final product.

The existing manhole and junction chambers shall be prepared for the application of the urethane system by cleaning and stoppage of infiltration as specified above. Prior to applying the urethane liner, the entire manhole surface and benches shall be patched and grouted to the extent needed to provide a smooth and even surface to which the liner will adhere.

The cured urethane system shall conform to the minimum physical standards, as listed below:

<b>CURED URETHANE</b>	<b>STANDARD</b>	<b>LONG-TERM DATA</b>
TENSILE STRENGTH	ASTM D-638	5,000 psi
FLEXURAL STRESS	ASTM D-790	10,000 psi
FLEXURAL MODULUS	ASTM D-790	550,000 psi

The Contractor shall provide certified independent, third party test results verifying the minimum physical properties listed above. The tests shall be in conformance with the ASTM specifications listed.

The finished liner shall be cured in strict accordance with the manufacturer’s instructions. Composite systems containing layers of different materials or cured-in-place resin systems that are inflated in the manholes will not be considered as equal.

W-52.08 Contractor Qualifications

The manufacturer and installer of the rehabilitation system shall be specialized in the design and installation of the rehabilitation system for at least 5 years. The installer shall be approved and certified in writing by the manufacturer and shall be completely trained in leak repair, surface preparation, and installation of the rehabilitation system. References shall be provided upon request to demonstrate that the installer has successfully used the rehabilitation system in Florida on a minimum of 5 projects, one of which must be at least 5 years old. The installer shall be the contractor or personnel in responsible charge, such as a superintendent or project manager who has been engaged in the business of furnishing and installing the rehabilitation system for a period not less than 5 years.

W-52.09 Thickness Verification and Inspection

The Contractor shall provide a method of verifying the actual coating thickness installed to ensure it meets or exceeds the minimum values specified. The proposed liner thickness verification method shall be submitted to the Engineer for approval.

The Contractor may utilize a wet film thickness gage meeting ASTM D4414 to ensure monolithic coating and uniform thickness during application. A minimum of three readings per 200 square foot area shall be recorded. Documentation on thickness readings shall be conveyed to the Inspector on a daily basis when the coating application occurs.

All phases of the manhole rehabilitations such as surface preparation, bench reconstruction, liner installation, annulus sealing, grouting, curing, testing, etc., will be inspected by the Department's Field Engineering personnel for conformance to the specifications, construction drawings, and liner manufacturer's instructions. The Contractor shall, therefore, coordinate his schedule for the installation of the structural coating system with the field office, and with due regard for site and weather conditions prevailing at the time.

The final manholes shall be completely free of defects.

The Contractor shall inspect all rehabilitated manholes utilizing closed circuit television 24 hours after coating system is complete. The intent of the inspection is to find any deficiencies to the finished liner. Contractor shall repair deficiencies within 1 week of notification. All television inspection videos to be provided to the City shall be in DVD format. One copy of the DVD shall become the property of the City.

#### W-52.11 Spark Testing

The coating system shall be spark tested prior to acceptance. The holiday testing shall be in strict accordance with NACE SPO188. After the coating has set hard to touch, it shall be inspected with high-voltage holiday detection equipment. An induced holiday shall be made onto the coated concrete surface and will serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of minimum specified (not average) film thickness applied but may be increased if it is insufficient to detect the induced holiday. All detected holidays shall be marked and repaired per the manufacturer's recommendations. All costs associated with the testing shall be born by the Contractor. Testing equipment shall be in good working condition and evidence of certified calibration within the last year shall be provided before the detection test equipment shall be used.

#### W-52.12 Warranty

The Manhole Rehabilitation Contractor shall furnish the City of Tampa with an unconditional 5-year warranty for materials and workmanship. This warranty shall be a guarantee against failure for the warranty period. Failure shall be defined to occur if the rehabilitation system fails to:

1. Prevent the internal damage or corrosion of the structure.
2. Prevent groundwater infiltration.
3. Adhere to existing structure wall.

If any failures occur within the specified warranty period after final acceptance, the Contractor shall repair or restore the structure to its previously accepted state including all materials, labor, and at no additional cost to the City. Repair shall be completed within 30 days of written notification of the failure.

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SECTION 62 - CONTROL AND WIRING FOR PACKAGED UNITS

W-62.01 General

The electrical requirements for packaged equipment shall be supplied as complete factory assembled units that require only external connections for installation. They shall include all electrical features necessary for the proper functioning of the units.

W-62.02 Standards

All control components shall comply with the latest ANSI, IEEE, and NEMA standards wherever applicable. The assemblies shall be listed as complying with the requirements of U.L., Inc., or other recognized testing organizations, for the particular service to be encountered, where possible.

The conduit and wiring on each unit shall be in accordance with the Workmanship and Materials section headed "Conduit, Wire and Grounding," unless otherwise shown or directed.

The Contractor shall be responsible for providing conduits and wires for field wiring of all the control devices to the packaged units whether such control devices are specifically shown or not. The Contractor shall include in his bid cost for installation and connections of all electrical equipment like control panels, switches, auxiliary control devices, conduit and wires, and all other appurtenances as required.

W-62.03 Electrical Characteristics

Controls for each unit having motors of 1/2 horsepower or larger, except as noted, shall consist of combination circuit breaker and magnetic starter, along with all required control transformers, relays, timers, heaters, and other necessary incidentals to provide a complete functioning unit. Starters shall be NEMA size 1 or larger. Motors shall be designed for 480-volt, 3-phase, 60-hertz operation with all controls at 115 volts or less.

Controls for each unit having motors of less than 1/2 horsepower shall be provided with 120-volt, single phase, toggle type thermal manual motor starter with neon pilot light.

W-62.04 Enclosures

Principal control components shall be installed in NEMA rated enclosures as follows:

<u>AREA</u>	<u>ENCLOSURE</u>
All areas listed Class I, Group C, D	NEMA 7 - Explosion-proof
Outdoor and below grade elevation indoor	NEMA 4X – Watertight; Corrosion-Resistant
Above grade indoor	NEMA 12 – Industrial; Dust-Tight

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## SECTION 63 - CONCRETE RESTORATION

### W-63.01 General

It is the intent of this specification to provide restoration of the existing, deteriorated concrete surfaces at the University Pumping Station.

### W-63.02 Scope

The scope of the concrete restoration is to (1) perform the surface preparation as specified herein including sand blasting the entire screen room surfaces to remove all corroded and built-up debris, (2) repair all deteriorated sections of concrete with the repair materials specified herein, and (3) coat all surfaces of the screen room's ceiling including the bottom and side of all beams as detailed on the plans.

### W-63.03 Surface Preparation

The Contractor shall remove all corroded materials from the concrete as shown and specified. All corroded materials shall be disposed of at an off-site location in accordance with all Federal, State, and local regulations.

The designated surfaces to be restored shall be prepared to a condition suitable for the installation of the proposed concrete repair and coating material in strict accordance with the manufacturer's instructions. Surface preparation shall include, but not be limited to, providing the proper surface profile for the proposed repair material and coating system. Removal of corroded materials shall be accomplished by sand blasting, mechanical removal methods (chipping, brushing, etc.), or other methods as approved by the Engineer. All sand blasting shall be followed by water blasting in order to remove sand and dust from the concrete substrate.

### W-63.04 Concrete Repair Materials

The following products manufactured by the Sika Corporation have been determined to be suitable for the necessary repairs. Products of other manufacturers may be acceptable, providing they meet or exceed the mechanical properties, service records and warranties of the following products:

1. SikaTop 123 Plus –a two-component, polymer-modified, non-sag cementitious mortar intended for vertical and overhead surfaces. This product also contains FerroGard 901 penetrating corrosion inhibitor.
2. Sika Armatec 110 EpoCem - a three component, solvent-free, moisture tolerant, epoxy-modified, cementitious product specifically formulated as a bonding agent and an anti-corrosion coating. This product shall be applied on existing steel reinforcement.

All surface preparation, storage and application of these products shall strictly conform to the manufacturer's instructions and recommendations. These products shall be manufactured to ISO 9001 and 9002 standards.

The structural concrete work including surface preparation and application of the specified concrete repair materials will be paid for under separate pay item per square foot by depth of

repair.

W-63.05 Coating System and Application

The proposed coating system shall be a 100% solids, plural component pure polyurea elastomeric membrane. Coating system shall be REA 203 as manufactured by V-Tac & Associates, Inc., Frasier, Michigan, or equal. The system shall be based on amine-terminated polyether resins, amine chain extenders and MDI prepolymers. The proposed coating system shall contain no volatile organic content (VOC's).

Surface preparation shall be in strict accordance with coating system manufacturer's recommendations. All substrate shall be cleaned, dried and primed as required for a successful coating application. The primer shall be a solvent free water based primer. Deteriorated concrete surfaces exceeding 1/8" loss in profile, especially areas with exposed steel reinforcement shall be repaired with the previously specified repair materials.

The same manufacturer shall supply all coating system materials. The coating system installer shall have a minimum 5 years experience and minimum application of 50,000 square feet with the proposed coating system and a minimum 10 years application experience in the coating industry. Project resumes including project descriptions and contact names shall be furnished upon request. The installer shall be manufacturer certified to install polyurea and confined space certified as applicable to the work involved in this project.

The manufacturer representative must visit the site to inspect and approve the surface preparation in writing prior to the coating application. All deficiencies shall be corrected as directed by the manufacturer's representative. The coating system shall be applied in strict accordance with the manufacturer's instructions and industry standards. The equipment to be utilized shall be suitable and as intended for the application of the proposed coating system, and shall be approved by the manufacturer and the Engineer. The application equipment shall spray the coating at a minimum 2,500 psi such as a Gusmer GX7 or equal. The manufacturer's representative shall inspect and approve the completed coating application in writing.

The following are the typical physical properties of the proposed polyurea coating system:

**TYPICAL PHYSICAL PROPERTIES**

SOLIDS	By Weight	100%
	By Volume	100%
	V.O.C.	0
	Weight per gallon	8.55 pounds
VISCOSITY	A component cps	500 approx. @ 77F
	B component cps	500 approx. @ 77F
CURE TIMES	Gel	Less than 2 seconds
	Tack Free	8-12 seconds
	Post cure	12 hours
	Recoat	0-12 hours
DRY	Stress/tensile strength	2500 psi+/- 100 (172 bars)

Elongation	265% +/- 50
100% Modulus	1600 +/- 100 psi
300% Modulus	1925 +/- 100 psi
Tear Resistance	430 +/- 50 PLI
Flame spread at 20 mil	10
Smoke density at 20 mil	5

\* \* \*

## SECTION 68 - MISCELLANEOUS PIPE AND FITTINGS

### W-68.01 General

Miscellaneous pipe and fittings include all aluminum, copper, brass, plastic, cast iron soil pipe and fittings. Such pipelines shall be provided where shown or specified.

Completely detailed working drawings shall be submitted by the Contractor for approval by the Engineer in conformance with the requirements of the General Provisions. Such drawings shall show the piping layouts and contain schedules of all pipe, fittings, valves, expansion joints, flexible couplings, hangars and supports, and other appurtenances. When any of the work is of special design, such work shall be shown in large detail and shall be completely described and dimensioned.

Miscellaneous pipelines which are shown in diagram on the Plans shall be arranged clear of other pipelines and equipment and be fitted and installed in a neat and workmanlike manner in accordance with approved shop drawings. An adequate number of unions shall be provided in main pipe and branch pipe runs to facilitate dismantling or removal of pipeline sections without disturbing adjacent branch or connecting lines.

Where connections between pipelines or equipment of corrosion- causing dissimilar metals are required, the junction of the two dissimilar metals shall be made through a dielectric insulating coupling, union, or other approved dielectric insulating device. Dielectric insulating fittings shall be those manufactured by Walter Vallett Company, Detroit, MI; EPCO, Inc., Cleveland, OH; or equal.

Couplings will be permitted only to join standard lengths of pipe and as required to complete a straight run of pipe. Joining by couplings, of random lengths of pipe and cuttings from standard lengths to form a required run, will not be permitted.

Reduced fittings shall be used for all changes in pipe size. Bushings will not be permitted.

### W-68.02 Aluminum Pipe and Fittings

Aluminum pipe shall be ANSI B36.10, Schedule 40, Alloy AA No. 6061-T6 conforming to ASTM B 241. Fittings shall be aluminum forged welding fittings or cast threaded fittings conforming to ASTM B 26 or B 108. Joints shall be flanged or made with aluminum mechanical couplings for use with grooved, flared, or plain end pipe. When grooved couplings are used, the grooves shall be rolled into the pipe in conformance with the coupling manufacturer's specifications. Cut grooves will not be permitted. Fittings and couplings shall be carefully assembled with an approved lubricating compound to prevent seizing of the connection and overstressing of the pipe. For pipelines subject to internal pressure, the lubricating compound shall provide lubrication and sealing.

Supports for aluminum pipelines shall be aluminum, hot-dipped galvanized steel or other approved type painted with a minimum of two coats of high quality aluminum paint before erection.

Where aluminum pipelines are specified to be hot bituminous coated and wrapped, the work shall conform with the requirements of the Workmanship and Materials section headed "Steel Pipe and Fittings," except that the reinforcing wrap used in conjunction with the coating shall be of borosilicate-type glass fiber.

Plastic tape wrapping may be used for aluminum pipelines in lieu of hot bituminous coating and wrapping. Plastic tape shall be 14 mils minimum thickness Polyken 900 or 980 as manufactured by the Kendal Company; Trantext E-20 as manufactured by Johns-Manville; or equal. The tape shall be applied over the manufacturer's primer and in strict accordance with the manufacturer's instructions. Plastic tape wrapping on pipelines shall be tested using high voltage type detection equipment to signal a holiday across a gap twice as great as the tape thickness.

Where aluminum pipelines are encased in concrete, all pipe and fittings in contact with concrete shall be given 4 coats of asphalt varnish meeting the requirements of Fed. Spec. TT-V-51.

Aluminum pipelines to be painted shall conform to the requirements of the Workmanship and Materials section headed "Painting."

Connections to equipment shall be made with screwed connections or flexible pipe as shown on the Plans. Flexible piping shall be of the same nominal size as that of the connected pipe with a strength adequate for the pipeline pressures specified. Pipe ends shall be securely anchored where connected to flexible piping. Flexible piping shall be helically corrugated metal hose with screwed connections and shall be Series 300, bronze braided, as made by Flexonics, Inc., Bartlett, IL. or equal.

#### W-68.03 Brass Pipe and Fittings

Brass pipe shall be red brass pipe meeting the requirements of ASTM B 43. Pipe sizes, wall thickness, and dimensions shall meet the requirements of ASTM B 251 Table I for regular pipe. Brass pipe fittings shall be screwed and malleable iron pattern meeting the requirements of ANSI B 16.15. They shall be finished rough, unless otherwise specified. Unions shall be of all brass or bronze with ground joints and shall be left semi-finished. Fittings shall be rated for steam working pressures up to 125 psi. Joints shall be screwed type with threads clean cut, tapered and smooth meeting the requirements of ANSI B2.1.

#### W-68.04 Plastic Pipe and Fittings

Plastic pipe and fittings shall be Schedule 80 PVC pipe meeting the requirements of ASTM D 1785 Type 1, Grade 1, normal impact.

Chlorinated polyvinyl chloride (CPVC) shall meet the requirements of ASTM F 441. Plastic fittings shall be solvent welding socket type meeting the requirements of ASTM D 2467 for PVC and F 439 for CPVC unless shown or specified otherwise. Solvent cement for PVC and CPVC plastic pipe and fittings shall meet the requirements of ASTM D 2564. Adequate provision shall be made for pipe expansion.

#### W-68.05 Cast-Iron Soil Pipe and Fittings

Cast-iron soil pipe and fittings shall be extra heavy and shall meet the requirements of Commercial Standard CS 188 published by the United States Department of Commerce. Pipe and fittings which will not be exposed in the finished work shall have a bituminous lining and coating meeting the requirements of ANSI A21.6. Pipe and fittings exposed in the finished work shall be painted on the outside as specified for cast-iron pipelines in the Workmanship and Materials section headed "Painting."

Joints shall be lead and oakum or rubber gasket compression type. Leaded joints shall be thoroughly caulked with packed oakum and molten lead. Twelve ounces of soft pig or bar lead shall be used in each joint for each 1-inch diameter pipe. The lead shall be poured in at one time. The face of lead joints shall be finished with the face of the hub and left without putty, paint, or cement. Rubber gasket joints shall have gaskets extending for the full depth of the bell and overlapping the face of the bell. All joints shall be leakproof and gastight. Joints made before setting pipe shall be remade after being placed in position.

#### W-68.06 Copper Pipe and Fittings

Copper pipe 3 inches in diameter and smaller shall be Type K hard drawn copper tubing and shall meet the requirements of ASTM B 88. Fittings for copper tubing shall be case-brass solder fittings. Joints shall be threaded or soldered.

Copper pipe larger than 3 inches in diameter shall be regular seamless copper pipe meeting the requirements of ASTM B 42. Fittings for copper pipe shall be solder type of the same material as the pipe. Joints shall be threaded or brazed.

#### W-68.07 Fiberglass Reinforced Plastic Pipe and Fittings

Fiberglass reinforced plastic (FRP) pipe and fittings shall be constructed by filament winding and custom contact molded techniques. The polyester resin used shall be corrosion resistant in the presence of sewage and sewage gases, shall be non-pigmented, and shall be ICI Americas ATLAC 400, Ashland Chemical ARAPOL 7240, or equal. FRP pipe shall be constructed in general in conformance with Voluntary Product Standard PS 15-69.

FRP pipe shall be free from all defects including indentations, delaminations, bubbles, pinholes, scratches, cracks, foreign inclusions, and resin-starved areas. The pipe shall be round and straight and the bore of the pipe shall be smooth and uniform.

The FRP pipe shall be a filament wound laminate with an inner corrosion barrier, a structural layer, and an out corrosion barrier. The inner layer shall be composed of "C" glass surface veil, 10 mils thick, and two layers of 1-1/2 ounce mat. This layer shall be hand rolled and allowed to harden.

The structural layer shall consist of alternate layers of filament wound roving, Type "E" glass, with a layer of 1-1/2 ounce mat embedded in the rovings at the mid-point of construction.

The outer layer shall consist of 1-1/2 ounce mat hand rolled. U.V. inhibitor shall be incorporated in the final coat of resin. The outer surface shall be relatively smooth with no exposed glass fibers.

Flanges shall be custom contact molded on pipe stubs with a liner of "C" glass and additional layers of 1-1/2 ounce mat. Flanges shall be designed for an internal pressure of 25 psi. The flange outside diameter, bolt circles, number of bolt holes, and bolt-hole diameters shall be in accordance with ANSI Class 150. All bolts shall be Type 304 stainless steel.

Cut edges shall be coated with the specified resin.

Mold release agents shall be removed prior to shipment.

FRP pipe and fittings shall be shipped horizontal on padded cradles. All tie-down straps shall have provisions for thermal expansion and shall be padded where in contact with the pipe or fittings. Flange faces shall be protected in shipment by covering with plywood or hardboard securely fastened.

#### W-68.08 Expansion and Flexible Couplings

Provisions for pipeline expansion shall be in accordance with the Workmanship and Materials section headed "Steel Pipe and Fittings."

#### W-68.09 Sleeves and Wall Castings

At all points where pipes must pass through walls or floors of structures where wall castings are not provided, the Contractor shall install suitable sleeves unless shown or specified otherwise. Sleeves inside buildings and between floors shall be of steel with a minimum thickness of Schedule 40 and the space between the pipe and the sleeve shall be caulked with lead and oakum. Sleeves through walls of structures shall be cast-iron solid sleeves meeting the requirements of AWWA C100 with caulked bell and spigot or mechanical joint ends, except as otherwise specified.

Sleeves through walls where piping materials, as scheduled and detailed on the Plans, are not suited for use with cast-iron solid sleeves as previously specified, shall be of steel with a minimum thickness of Schedule 40. Seals shall be modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the sleeve. The modular mechanical seals shall be Link Seal as manufactured by Thunderline Corp., Wayne, MI, or equal.

Piping and vents through roofs shall be provided with caulked sleeves and a 6-pound sheet lead flashing consisting of a 24- by 24-inch flat base with a tubular vertical sleeve surrounding the pipe. The tubular sleeve shall turn in at the top of the pipe or be attached to the pipe with a flashing ring, depending on the termination arrangement of the pipe or vent.

#### W-68.10 Cleanouts

Cleanouts shall be provided where shown or specified, and shall meet the requirements of the Workmanship and Materials section headed "Ductile Iron Pipe and Fittings," unless otherwise specified.

#### W-68.11 Laying and Jointing Buried Pipelines

Miscellaneous pipe shall be transported, delivered, and installed in accordance with the requirements of the Workmanship and Materials section headed "Laying and Jointing Buried Pipeline."

#### W-68.12 Erecting and Jointing Interior Piping

All miscellaneous pipelines shall be permanently erected and supporting devices shall be furnished and installed as specified in the Workmanship and Materials section headed "Erecting and Jointing Interior Piping."

### W-68.13 Insulation

Miscellaneous pipelines shall be insulated where shown or specified and shall conform to the requirements of the Workmanship and Materials section headed "Insulation."

### W-68.14 Drip Pans

The Contractor shall furnish and install 16-ounce copper polished reinforced drip pans under all metallic pipelines installed over electrical equipment. The drip pans shall be properly drained, tapped, and connected with 1/2-inch red brass pipe into the drainage system.

### W-68.15 Soil and Waste Piping

All piping for soil or waste, and vent 3 inches in diameter and smaller shall be of copper as specified hereinbefore unless otherwise shown or required. All piping for soil, waste, vent or drain lines 4 inches in diameter and larger, shall be ductile-iron soil pipe as specified hereinbefore unless otherwise shown or required. Screwed cleanouts shall be provided at the ends of all drainage lines, at changes of direction, and at other points to make the entire drainage system accessible for rodding. Cleanouts shall be the same size as piping but not larger than 4-inch diameter and shall be closed gastight with cast-brass cleanout plugs. Cleanouts not accessible below the floor shall be extended to the floor level and provided with deck plateplugs.

Horizontal soil or waste drainage piping 2-1/2 inches in diameter and smaller shall be installed with a minimum uniform pitch of 1/4 inch per running foot. Horizontal soil or waste drainage piping 3 inches in diameter and larger shall be installed with a minimum uniform pitch of 1/8 inch per running foot. Offsets in piping shall be made at angles of 45 degrees or less. Horizontal vent piping shall be graded to prevent an accumulation of water.

Each vent pipe passing through a roof shall be provided with a 6-pound sheet lead flashing consisting of a 24- by 24-inch flat base with a tubular vertical sleeve surrounding the pipe. The tubular sleeve shall turn in at the top of the pipe or be attached to the pipe with a flashing ring, depending on the termination arrangement of the pipe or vent.

### W-68.16 Hot and Cold City Water Piping

Water piping shall be installed to permit easy drainage of all parts of the system. Low points of water piping shall be provided with a 1/2-inch globe valve, nipple, and 3/4-inch hose coupling.

Swing joints or expansion loops shall be installed where necessary to allow for pipe expansion. Branches from hot water mains shall be provided with at least four fittings, including the tee in the main. Threaded fittings shall be used at swing joints.

All piping shall be sectionally controlled by shutoff valves to permit shutting off groups of fixtures without interrupting service to other parts of the system. All connections to equipment, fixtures, and apparatus shall be provided with shutoff valves. All valves shall be installed with stems on the horizontal or above the horizontal. Valves shall not be installed with stems below the horizontal plane.

Air chambers at least 12 inches long and the same pipe size as the water branch shall be

provided at each plumbing fixture. All nipples shall be made of extra heavy pipe. Close nipples will not be permitted.

W-68.17 Drains

Piping for floor drains shall be ductile-iron soil pipe as specified hereinbefore. Floor drainage piping shall be pitched as shown or required to give complete drainage. Screwed cleanouts shall be provided at the ends of all drainage lines, at changes in direction, and at other points necessary to make the entire drainage system accessible for rodding. Cleanouts shall be the same size as piping but not larger than 4 inches, unless otherwise shown or specified. Equipment drains shall be 2 inches minimum or larger if required for approved equipment. Equipment drains are only generally located on the Plans. Final locations of equipment drains shall be as required to serve approved equipment.

In the following schedule of drainage appurtenances, catalog numbers refer to items manufactured by Josam or Neenah Foundry. Equal items by Wade, Zurn, or East Jordan Iron Works will be acceptable:

Roof Drains: Josam 4110, 4-inch minimum  
Floor Drains: Josam 3510, 4-inch unless otherwise shown  
Cleanouts: Josam 8310  
Equipment Drains: Josam 3510 with Model FF Funnel  
Gallery Drains: Neenah Model R-4941

W-68.18 Painting, Linings, Coatings

Painting shall conform to the requirements of the Workmanship and Materials section headed "Painting."

Linings and coatings, unless specified otherwise, shall be applied to all parts of the pipelines, including fittings, flanges, wall pipes, or castings.

Where buried piping connects to aboveground pipe, the coating or other protection for the buried pipe shall extend 6 inches above finish or other grade given by the Engineer.

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## SECTION 76 - CONDUIT, WIRE, AND GROUNDING

### W-76.01 General

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.

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.

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.

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". Four sets of final prints, along with an equal number of bound instruction manuals and parts lists shall be given to the Engineer at the end of the job.

Excavation, backfill, form work, concrete, and reinforcing shall be in accordance with the applicable Workmanship and Materials sections.

### W-76.02 Underground Ducts

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.

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.

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.

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.

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.

#### W-76.03 Liquidtight Flexible Nonmetallic Conduit (Size 2 Inch or Less)

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. Compatible liquidtight nonmetallic fittings shall be used for conduit installation. The flexible conduit and fittings shall be as manufactured by Carlon, Kellems, K-Flex, or equal.

#### W-76.03(a) Liquidtight Flexible Metallic Conduit (Greater Than 2 Inch)

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. Compatible liquidtight metallic fittings shall be used for conduit installation. The flexible conduit and fittings shall be as manufactured by Thomas & Betts or equal.

#### W-76.04 Metallic Conduit and Boxes

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.

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.

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.

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.

PVC coated boxes and fittings shall be used in PVC coated conduit systems.

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.

Where it is necessary to use electrical unions, Universal, Erikson, or equal conduit couplings shall be used.

#### W-76.05 Conduit Installation

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.

The Contractor shall note that conduit runs shown are for the purpose of outlining the general method of routing the conduits to avoid interferences.

All other conduit shall be run exposed, except where shown otherwise.

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.

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.

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.

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.

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.

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.

#### W-76.06 Conduit Connections to Equipment

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.

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.

Conduit connections shall be made with approved flexible nonmetallic conduit if the equipment is subject to adjustment, mechanical movement, or vibration. Flexible conduit connections shall be watertight.

#### W-76.07 Expansion Fittings

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.

#### W-76.08 Terminal, Junction, and Pull Boxes

Junction and pull boxes shall be installed as shown and as required.

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.

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.

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.

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.

All boxes shall be provided with partitions as shown and as required.

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.

#### W-76.09 Hazardous Areas

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. 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.

Sealing shall be provided for all conduits within and leaving hazardous areas as required.

#### W-76.10 Grounding System

A complete grounding system shall be in accordance with applicable ANSI, IEEE, and NEC Standards and local codes.

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.

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.

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.

An equipment grounding conductor shall be installed in all electrical raceways, and shall be sized in accordance with Article 250.95 of the National Electrical Code (NEC).

Exposed or buried ground conductors shall be bare copper wires or bars of the proper sizes.

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.

Grounding conductors run in conduits with circuit conductors shall be stranded cable with 600-volt green XHHW, TW, THW, or RHW Code insulation.

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.

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.

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.

Welds embedded in the ground or concrete shall be cleaned and painted with an asphaltum base paint.

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.

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.

#### W-76.11 Wires and Cables - General

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.

#### W-76.12 600-Volt Wire and Cable - Conductors

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.

#### W-76.13 600-Volt Power and Control Cable - Insulation

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.

**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.

**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.

#### W-76.14 Instrumentation / Data Cables - Insulation

**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.

**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.

**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.

**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.

**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.

#### W-76.15 600-Volt Wire and Cable - Installation

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.

Cable reels shall be stored on concrete or other hard surface, or shall be lagged with 2 x 4 wood laggings providing 100% coverage.

No splicing will be permitted, except in junction boxes.

Lug bolting at terminals, devices, or bus bars shall be made up with a flat washer, a Belleville washer, and a locknut.

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.

#### W-76.16 600-Volt Wire and Cable - Splices and Terminations

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. Lug bolting at devices or bus bars shall be made up with a flat washer, a Belleville washer, and a locknut.

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.

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.

Splices shall not be made within manholes unless specifically approved by the Engineer.

#### W-76.17 600-Volt Wire and Cable - Tests

The 600-volt insulated cables shall be factory tested prior to shipment in accordance with IPCEA standards for the insulation specified.

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.

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.

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.

#### W-76.18 Identification of Circuits

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.

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.

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.

<b>240/120 VOLTS</b>	<b>PHASE</b>	<b>480Y/277 VOLTS</b>
Black	A	Brown
Orange (High-Leg)	B	Orange
Blue	C	Yellow
White	Neutral	Gray or White
Green	Ground	Green

**Color Coding:**

W-76.19 Wire and Cable Connections to Equipment

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.

W-76.20 Painting

Conduit and boxes shall be painted in accordance with the Workmanship and Materials section headed “Painting.”

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.

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## SECTION 84 - VALVE AND GATE OPERATORS

### W-84.01 General

All valves and sluice and slide gates shall be manually operated unless otherwise shown or specified. Operators include manual operators with levers, tee wrenches, handwheels, chain wheels and chains, cranks and floor stands; electric motor operators with manually operated handwheels; pneumatic cylinder operators and sluice and slide gate electric motor operators designed for continuous duty service to provide modulating or throttling control.

Valve and sluice and slide gate operators shall be provided complete with all appurtenances necessary for the equipment to perform its intended function. Such appurtenances include, but are not limited to, anchor bolts and other mounting hardware, limit switches, pressure switches, gauges, control switches and control valves, electrical supply connections, air supply piping, control valves and regulating controls, solenoid valves, extension stems, local and remote indicators, torque switches, operating nuts, purge water service with all associated piping valves and controls, push-button controls, indicating lights, floor boxes, direct burial valve boxes, and other such items.

All electrical equipment and appurtenances associated with valve and gate operators installed in hazardous areas shall meet the requirements for Class I, Division I, Group D hazardous areas and shall be approved by the U.L., Inc. for use in such areas.

All valves and sluice gates shall be manually operated, unless otherwise shown, specified, or directed.

All direct burial valves shall be provided with adjustable type cast-iron valve boxes and extension stems to grade. All direct burial valves and valves in manholes shall have operating nuts and extended operating shafts to grade or as shown. Two tee wrenches shall be provided for each size and type of operating nut.

Manual operators for valves 3 inches and larger shall be handwheels, unless otherwise shown or specified.

Plug valves 8 inches and smaller shall be wrench operated with operating nuts. One wrench of suitable length shall be furnished for each three of such size operating nuts. Plug valves with operating nuts that are extended shaft type and operated from floor boxes shall be provided with two tee wrenches for each size and type of operating nut. Plug valves 10 inches and larger shall be gear operated with handwheels.

Any plug or butterfly valve located 7 feet or more above the operating floor shall have chains and chain wheel or chain lever operators to permit operation from the operating floor. The Contractor shall provide suitable hooks fastened to walls or other parts of the structure on which the chains may be hung when not in use.

Butterfly valve operations shall meet the requirements of AWWA C504, except as otherwise shown or specified. Manual butterfly valve operators shall be of the worm gear or traveling nut type and all gearing shall be totally enclosed. Butterfly valves 8 inches and smaller on process air lines may be lever operated.

Worm gear type operators shall include a worm gear and matching drive worm. Bearings shall be provided for each rotating member.

Traveling nut type operators shall include a threaded steel screw and a bronze nut. A slotted lever or link lever system shall be provided to transfer the applied torque to the disc shaft. All rotating shafts, screws, and links shall have separate bearings. Thrust bearings shall be provided.

#### W-84.02 Manual Valve Operators

Manual valve operators shall be of the lever type, handwheel, chain lever, chain wheel with worm gear or wrench type and shall be designed so that a pull of not more than 40 pounds on the manual operator will produce an output torque equivalent to the maximum valve shaft torque required to operate the valve under maximum line pressures and velocities. Lever and wrench handles and gear operators shall be of the locking type to prevent the valve disc from creeping or fluttering when in any intermediate position between open and closed. Gear operators shall be permanently lubricated, totally enclosed, with adjustable stops for the open and closed positions to prevent overtravel in either direction and shall have a valve disc position indicator.

Manual valve operators shall be provided for direct burial butterfly valves.

#### W-84.03 Floor Stands

Floor stands for 12-inch and smaller valves and sluice gates and 24-inch and smaller slide gates shall be wheel operated without gears. Floor stands for 12-inch to 20-inch valves and gates shall be single crank, single speed operated. Floor stands for 24-inch and larger valves and gates shall be single crank, two speed operated.

Materials used in floor stands shall meet the requirements of the specifications for materials used in valves and sluice gates. Frames shall be of cast iron of heavy and substantial design with smooth exterior and neat appearance. Adequate provision shall be made for lubrication and all operating parts shall be protected.

Each floor stand shall be equipped with a nameplate stating the gate or valve controlled by the stand shall also be stamped with an arrow and the word "Open" to indicate the direction of rotation.

Floor stands for rising stem valves or gates shall be fitted with ball or roller bearings designed to take the thrust and equipped with a hood to protect the stem and an indicator to show the position of the valve or gate, as specified under the Workmanship and Materials section headed "Sluice Gates." Floor stands for nonrising stem valves or gates shall be provided with an indicator to show the position of the valve or gate.

Operating nuts shall be of bronze meeting the requirements of ASTM B62, finished all over, suitably splined to connect with the handwheel or gear and with threads which will engage smoothly

with those of the lifting shaft.

Crank-operated floor stands shall be operated by a crank that will open the valve or gate when the crank is turned counterclockwise. The center of the crank shall be approximately 38 inches above the floor. Gears shall be bevel or worm, of hardened steel or manganese bronze, with machine cut teeth and shall be enclosed in a cast-iron body. The crank shall have a brass, sleeve-type handgrip rotating freely on the handle. The gear ratio shall be such that the stand will operate the valve or sluice gate with a maximum force of 40 pounds on the crank at the single or low speed.

Handwheel-operated stands shall have handwheels that open the valve or sluice gate when the wheel is turned counterclockwise. The center of the handwheel shall be approximately 36 inches above the floor. The handwheel shall be of sufficient diameter so that the stand will operate the valve or sluice gate with a maximum pull on the handwheel of 40 pounds.

Floor stands shall be solidly and accurately set to center over the gate or valve and shall be bolted to the floor with through-bolts wherever possible.

Approximately 3/4 inch of Embeco cement grout or equal shall be placed beneath the floor stand to assure uniform support.

#### W-84.04 Bench Stands

Bench stands shall meet the requirements for floor stands, except that instead of a conventional pedestal for floor mounting, a special housing adapted to bench stand use shall be provided. Manually operated floor stands located more than 7 feet above the floor shall be provided with chains and chain wheels, meeting similar requirements specified herein and in the Workmanship and Materials section headed "Valves."

#### W-84.05 Electric Motor Operators

Valve and sluice gate motor operators shall be the close-coupled electric motor-driven screw type. Valve motor operators shall operate the valves from full closed to full open in 120 seconds when the valve is subjected to rated pressure and flow. Sluice gate motor operators shall be capable of operating the gates at a rate of 12 inches per minute in either direction when the gate is subjected to maximum head. Motor operators shall be totally enclosed NEMA 4 or NEMA 7 where explosion-proof construction is shown or specified. Operator enclosures shall be provided with 120-volt compartment heaters. The motor operator shall comprise a motor, power gearing, a handwheel operator, an integral controller, limit and torque switches and push buttons for open-stop-close operation. Valve operators shall have an external indicator to show the position of the valve. Gate operators shall include floor stands and yokes for self-contained gates. Additional limit switches, indicating lights, position transmitters and remote position indicators, remote operating controls and other accessories and controls shall be provided as shown, specified, or required.

Each operator shall be arranged for 480-volt, 3-phase, 60-hertz electrical supply. All controls shall be 120-volt, single-phase, 60-hertz and shall be provided with an integral 480/120-volt control transformer with fused secondary.

Motors shall be of the high starting torque, ball bearing, squirrel-cage type designed for intermittent operation on 480-volt, 3-phase, 60-hertz electrical current, except as otherwise shown, specified, or required. The stator windings shall have Class B or better insulation. Joints at the end rings shall be silver soldered, unless the bars of the squirrel-cage winding are cast integrally with the end rings. The operator shall have geared limit switches to stop the movement in each direction and adjustable torque switches to stop the opening or closing movements in case of an obstruction. At the end of two complete operating cycles with no intervening time delay, the motor winding or controller elements shall not exceed a temperature rise of 75 degrees C above an ambient or 40 degrees C when measured by thermometer, or 85 degrees C when measured by resistance.

The motor shall be capable of operating the gate or valve against the maximum differential line pressure when voltage at the terminals is within 15 percent of nominal voltage.

Drive units shall be arranged to permit the motor to attain full speed before the load is energized. Overload relays shall be provided in each phase of the motor. Full calculations for each size of motor operator indicating forces, full load and locked rotor current and horsepower shall be furnished to the Engineer for approval.

A handwheel or crank shall be provided for manual operation. The operator must be responsive to manual operation at all times, except when being electrically operated. The handwheel shall not rotate during electric operation. The motor shall not rotate during handwheel operation nor shall a fused motor prevent manual operation. When in manual operating position, the operator shall automatically return to electric operation when the motor is energized and remain in the motor position until manual operation is desired. The movement from motor to manual operation shall be accomplished by a positive declutching mechanism which will disengage the motor mechanically but not electrically. Failure of motor gearing shall not render hand operation impossible. Handwheels shall be removable and adaptor keys provided to permit operation by a portable operator. Electrical operation of the motor shall be as shown or specified.

The controller shall be a NEMA rated reversing controller, complete with mechanical interlocks and overload relays, and be an integral part of the operator. Contacts shall be provided for indicating lights as shown, specified, or required. One light on shall indicate that the gate is fully open; the other light on shall indicate that it is fully closed; and both lights on shall indicate that it is in an intermediate position. The internal wiring in the valve operator shall be arranged so that the opening and closing coils cannot be energized simultaneously at any time, regardless of external wiring connections.

Power gearing shall consist of generated gears of heat-treated steel and worm gearing. The worm shall be of hardened alloy steel with the threads ground and polished after heat treating. The worm gear shall be of chilled nickel bronze. Antifriction bearings shall be used throughout and the operator shall be grease or oil bath lubricated. Lubricants shall be suitable for ambient temperatures from 40 to 150 degrees F.

Limit switches and torque switches shall be the adjustable type with auxiliary contacts, operative in either direction of travel. Limit switches shall be "in step" with torque switches at all times whether in motor or manual operation. The operator shall have geared limit switches to stop movement in each direction and torque switches shall be provided for protection against mechanical overload and to stop movement in either direction if an obstruction is encountered. The number,

function, and arrangement of limit switches shall be as shown, specified, or required.

When used for gates or valves specified for continuous duty service (but not modulating or throttling continuous duty service), motor operators and all required accessories shall be designed for such service. Such motor operators shall conform to all applicable requirements specified herein and, in addition, the operator shall be designed to move gates at a speed of 12 inches per minute in either direction. An easily replaceable stem nut shall be provided which can be installed in the top of the unit without removing the operator from the stand. The stem nut shall be of nylon suitable for continuous duty service without stem lubrication.

Motor operators shall be as manufactured by E-I-M Company; Limitorque Corp.; Rotork, Inc.; or equal.

#### W-84.06 Electric Gate Motor Operators - Modulating Service

Sluice gate electric motor operators shall be designed for continuous duty modulating service where shown, specified, or required. The operator shall be arranged to move the gate at a speed of 6 inches per minute in either direction.

Motors shall be specifically designed and rated for continuous duty operation and arranged for 240-volt, single-phase, 60-hertz electrical power supply. Power gearing shall be of sufficient capacity to provide adequate service life for continuous duty modulating service.

Operators shall have an easily replaceable stem nut which can be installed in the top of the unit without removing the operator from its floor stand. The stem nut shall be of nylon suitable for modulating service without stem lubrication.

The control module shall be an electronic solid state type with proportional power variation to control the speed of the d-c motor. The control module shall be integrally mounted within the operator switch compartment and shall consist of an error detection circuit powered by a closely regulated d-c power supply and a thyristor section to power the motor. The control module shall be capable of accepting a 4-20 ma d-c signal. The error detection section of the module shall compare the in-out signal to the feedback signal and if a difference greater than one percent is detected, it shall cause the motor to move the gate to the appropriate position at a speed proportional to the amount of error. For very small signals, an integrating circuit shall automatically increase the trigger time to the thyristors to decrease the error. There shall be no bumping or hunting in the operation. A span adjustment shall be provided which shall be 100 percent of command signal span. There shall be no interaction between any adjustments on the control module such as span, dead band, gain, and zero.

A 2-position selector switch marked AUTO and MANUAL plus two push buttons marked OPEN and CLOSE shall be integrally mounted on the operator. A key locking arrangement shall be provided and arranged so that the operator cannot be shifted out of the AUTO position without insertion of a key device. The OPEN and CLOSE push buttons on the operator shall be inoperable when the unit is in the AUTO position. When in the AUTO position, the operator shall respond to a signal as shown, specified, and required. When in MANUAL position, the operator shall be operable by either push buttons or handwheel.

The operator shall be designed such that an increase in signal will open the gate and upon loss of signal the gate will remain in position.

Other accessories and controls such as remote operating push buttons, indicators, position transmitters, and like items shall be provided as shown, specified, or required.

Motor operators for continuous duty modulating service shall be the "Modutronic" model as manufactured by Limitorque Corporation, or equal.

#### W-84.07 Valve Limit Switches

Valves shall be provided with suitable mechanical cam gear type limit switches for remote operation, indication and other control as shown, specified, and required. Each limit switch shall be compatible with its associated operation and suitable for the service intended. Limit switches shall be furnished with valves by the valvemanufacturer.

Mechanical limit switches shall be 2-pole, 3-pole, or 4-pole gang-mounted in required multiples and with necessary mechanical linkage. Switch contact ratings shall be 120-volt a-c, 20 amperes at 75 to 100 percent power factor, and 124-volt d-c, 5 amperes minimum. Mechanical limit switches shall be Series SL2, 3, or 4HC for normal use, as manufactured by National Acme, Cleveland, Ohio, or equal. Explosion-proof type shall be Series SL2, 3, or 4XC, or equal. All enclosures shall be watertight and oiltight for normal service and of cast aluminum for explosion-proof type. Operating levers shall be National Acme Series D-1260, or equal. Switches shall be complete with all racks, gears, cam, linkages, mountings, and accessories as required.

#### W-84.08 Pneumatic Cylinder-Operated Pump Check Plug Valves

Each pneumatic cylinder-operated pump check plug valve shall include a 4-way, solenoid-operated pilot valve, a limit switch, a manual override system on the solenoid, a manual selector switch, a double-acting pneumatic cylinder, speed control valves, piping, pressure switch, and rapid closing system with 2-way solenoid valve. Accessories and connection to the plant air system shall be as shown, specified, and required.

The operation of the automatic pump check valves shall be as follows:

1. Pump motor starts. The control pressure switch, located between the pump and check valve, closes due to pumping pressure and energizes the 4-way solenoid pilot valve.
2. Air enters the cylinder actuator and the valve begins to open at a preset speed.
3. The valve continues to open as the pump output increases.
4. Valve and pump reach 100 percent capacity simultaneously.

#### Close Cycle

1. When a pump stop signal is initiated for any particular control sequence shown, the 4-way solenoid pilot valve is de-energized causing the check valve to begin the closing cycle at a

2. preset speed.  
Pump motor continues to run.
3. As the valve moves towards the closed position, the limit switch contacts open at a preset point, de-energizing the motor starter coil. The motor starter contacts open at a preset point, de-energizing the motor starter coil. The motor starter contacts open and the pump motor stops.
4. The valve continues to close as the pump slows down, the valve closing completely just as forward flow from the pump stops.
5. The system is ready for another open cycle.

### Manual Functions

1. A manual override button shall be furnished on the 4-way solenoid pilot valve to allow manual, local operation of the check valve.
2. For manual operation, a manual-automatic selector valve shall be provided. In the manual position, the actuator piping is isolated from the supply pressure and the pressure between the opposing cylinder supply lines is relieved permitting manual operation of the valve by a wrench on the manual nut.

### Rapid Closing Operation

1. A 2-way quick close solenoid pilot valve shall be provided on the cylinder operator which shall be continuously energized. Upon power failure to the pump motor, this valve shall be de-energized, causing the check valve to close immediately.

Each pneumatic cylinder shall have a fiberglass barrel with plastic coated cast-iron piston, and shall be guided throughout the length of its travel by teflon wearing rings, and shall have Buna-N seal rings. The piston rod shall be of nickel plated steel with O-ring rod packing. The cylinders shall be designed and built for valve operation at the pressure of the pipeline in which the valve is located when operated by a compressed air supply of 80 psig. The cylinders shall be fitted with a speed control valve consisting of a combination needle and check valve on each pipe connection to provide timing control in each direction of movement.

A control pressure switch shall be located on each pump discharge line between the pump and the pneumatic cylinder-operated pump check plug valve. The pressure switches shall be watertight, NEMA 4 and factory filled and sealed with an operating range from 5 to 100 psig and provided with a diaphragm seal with cleanout ring and purge water connection. Each pressure switch and MSAG diaphragm seal shall be stainless steel as manufactured by Mercoid Corporation, Chicago, IL, or equal.

Control pressure switches shall be field adjustable and shall be set so that the valve begins to open when the upstream pressure is approximately equal to the downstream pressure.

Pneumatic cylinder operators for plug check valves shall be those manufactured by De Zurik

Corporation, Sartell, Minnesota, or equal.

W-84.09 Pneumatic Cylinder Valve Operators

Each pneumatic cylinder-operated valve arranged for manual open-close operation shall have an operator consisting of a 4-way solenoid-operated pilot valve with manual override, limit switches, speed control needle and check valves, piping, double-acting pneumatic cylinder, and required operating controls and accessories, all as required for a complete operation.

Pneumatic cylinders shall conform to those specified for pneumatic cylinder-operated pump check plug valves.

Operation of the valves shall be as shown, specified, and required.

W-84.10 Valve Boxes

Direct burial butterfly valves shall be provided with cast-iron soil pipe valve boxes and covers as shown. Other direct burial valves shall be provided with adjustable type cast-iron valve boxes with covers.

Valve boxes shall be of proper dimensions to fit over valve bonnets and extend to such elevation, at or slightly above finished ground surface, as shown or directed. Valve boxes shall be set vertical and concentric with valve stems. Any valve box which has moved from its original position so as to prevent application of the valve wrench shall be satisfactorily reset by the Contractor at his own expense.

W-84.11 Manufacturer's Supervision

The services of qualified representatives of manufacturers of gates and pneumatic cylinder-operated pump plug check valve systems shall be provided. The representatives shall inspect the installation of the equipment, make any necessary adjustments, place the equipment in initial trouble-free operation, and instruct operating personnel in its operation and maintenance.

W-84.12 Spare Parts

A spare nylon stem nut shall be furnished for each continuous duty service gate.

W-84.13 Painting

Exterior iron and steel surfaces of all gate and valve operators and appurtenances shall meet the requirements of the Workmanship and Materials section headed "Painting." Chain wheels and levers shall be coated by galvanizing or electroplating with zinc or cadmium. Chain shall be coated by electroplating with zinc or cadmium. Zinc electroplating shall meet the requirements of Fed. Spec. QQ-Z-325 Type II Class 2, and cadmium electroplating shall meet the requirements of Fed. Spec. QQ-P-416 Type II Class 2.

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## SECTION 88 - CAULKING AND SEALING

### W-88.01 General

Caulking and sealing includes furnishing and installing the caulking and sealing work shown, specified, and required to complete the work. Caulking and sealing shall include, but is not limited to, the following: interior and exterior perimeter joints around all doors, windows, louvers, and frames; control joints; expansion and contraction joints, pressure-relieving joints, stone masonry joints, precast concrete joints, perimeter of ducts and conduits at walls and partitions and accessories and appurtenances required for the work.

Materials other than the sealant shall be as recommended by the sealant manufacturer and as approved.

### W-88.02 Materials

The sealant shall be based on liquid polyurethane polymer. The sealant shall be delivered to the job site in sealed containers bearing the manufacturer's name and product designation. The sealant shall be a two component elastomeric sealant conforming to Fed. Spec. TT-S-00227E or ANSI 116.1.

The color of the sealant shall match that of the adjacent surface.

Primer, where required, shall be tested for staining and durability on samples of actual surface to be sealed.

Backup materials and preformed joint fillers shall be nonstaining, compatible with sealant and primer, and of a resilient nature, such as closed cell polyethylene rod, closed cell urethane or neoprene rod, or elastomeric tubing or rod. Materials impregnated with oil, bitumen, or similar materials shall not be used. Size and shape shall be as shown by joint details. Sealant shall not adhere to backup material.

Bond breakers, where required, shall be polyethylene tape.

Solvents and cleaning agents shall be compatible with the caulking compound, backup material, and bond breakers.

Primer, backup materials, bond breakers, and solvents shall be as recommended by the sealant manufacturer in writing.

### W-88.03 Installation

All joints shall be thoroughly cleaned and all foreign matter such as dust, oil, grease, water, surface dirt, and frost removed. Porous materials such as concrete, masonry, or stone shall be cleaned by mechanical means, water blast cleaning, acid washing, or a combination of these methods as required to provide a clean, sound base surface for adhesion of the caulking compound.

Concrete shall be fully cured and free of laitance, loose aggregate, mold release agents, curing compounds, water repellents, and other surface treatments. If surface treatments are present, tests for adhesion shall be made before proceeding with the caulking and sealing.

Nonporous surfaces such as metal and glass shall be cleaned by approved mechanical means. Protective coatings on metallic surfaces shall be removed by a solvent that will not stain or leave a

residue. Joint areas shall be protected with masking tape or film and shall be cleaned after removal of tape or film.

Joints which are shown to receive caulking and sealing shall be a minimum of 1/4 inch wide by 1/4 inch deep, unless otherwise approved.

Joints in concrete, masonry, and stone shall be as follows:

<u>Joint width</u>	<u>Depth of Caulking</u>
Up to 1/2 inch	Equal to width of joint
1/2 to 1 inch	1/2 inch
1 to 2 inches	1/2 of the joint width

Joints in metal, glass, and other nonporous surfaces shall be a minimum depth of one-half the applied sealant width, and shall not exceed the applied sealant width.

Backup material or joint filler, of the type and size specified or shown, shall be installed at the proper depth in the joints to provide sealant dimensions specified. Backup material shall be of suitable size and shape so that when compressed, 25 to 50 percent, it will fit in joints as required. The sealant shall not be applied without backup material and, if necessary, bond breaker strip. When using backup of hose or rod stock, the material shall be rolled into the joint to avoid lengthwise stretching. Hose or rod stock shall not be twisted or braided. Specified bond breaker strips shall be used between sealant and supporting type backup material. Bond breaker strips shall be used between sealant and supporting type backup material. Bond breaker strips shall be used in all joints where sufficient room for backup does not exist.

All caulking and sealing work shall be done by workmen specializing in the application of caulking and sealants in strict conformance with the sealant manufacturer's recommendations. Masking tape shall be applied, where required, in continuous strips in alignment with joint edge. The sealant shall be applied with a power-actuated gun or other means approved by the Engineer. The gun shall have a nozzle of approved size and shall provide sufficient pressure to completely fill the joints as detailed. All joint surfaces shall be neatly pointed or tooled to provide the contour of recess indicated on the details and the masking tape shall be removed. All joints shall be watertight.

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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. Debris shall be defined as all material existing in the pipeline for which removal is required to provide a clean pipeline.

W-113.02 Scope of Work

The Contractor will be permitted to transport and temporarily store debris at the Howard F. Curren AWT Plant at 2700 Maritime Boulevard between the hours of 6:00 a.m. to 6:00 p.m., as directed by the Engineer. Within 30 days after the completion of the work, the Contractor will be responsible for hauling the stored debris from the Treatment Plant to an approved disposal site. Final payment will not be issued until the debris is entirely removed from the temporary storage area. The Contractor shall also be responsible for providing all equipment required for dumping and collecting debris at the temporary storage area. No Treatment Plant personnel or equipment will be provided for this purpose. In addition, 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.

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