

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 23-C-00001

109th Avenue Pump Station Rehabilitation

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

JUNE 2023

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

BID NOTICE MEMO

Electronic Bids are not allowed for these projects.

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

CONTRACT NO.: 23-C-00001; 109th Avenue Pump Station Rehabilitation

BID OPENING: 1:30PM, Tuesday, July 25, 2023 **ESTIMATE:** \$2,371,000 **SCOPE:** The project will replace the existing wet-dry pit pumping station with a more efficient, reliable and serviceable submersible pumping station. The project will include the installation of new pumps, piping, valves, and electrical and control systems.

Bids will be opened in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida 33602. The public is not allowed to attend in person. To view the Bid Opening follow these instructions:

To join the Microsoft Teams meeting from your computer, tablet, or smartphone. [Click here to join the meeting](#) Meeting ID: 273 536 121 423 Passcode: EJGjYu
[Download Teams](#) | [Join on the web](#) Or call in (audio only) [+1 941-263-1615,,581517187#](#) United States, Sarasota Phone Conference ID: 581 517 187# [Find a local number](#) | [Reset PIN](#)

In accordance with the Americans with Disabilities Act (“ADA”) and Section 286.26, Florida Statutes, persons with disabilities needing a reasonable accommodation to participate in this public hearing or meeting should contact the City of Tampa’s ADA Coordinator at least 48 hours prior to the proceeding. The ADA Coordinator may be contacted by phone at 813-274-3964, email at TampaADA@tampagov.net, or by submitting an ADA - Accommodations Request online form available at <http://www.tampagov.net/ADARequest>.

Please note that the City of Tampa may not be able to accommodate any request received less than 48 hours before the scheduled public hearing or meeting.

Plans and Specifications and Addenda for this work may be examined at, and downloaded from, www.demandstar.com.

Files are also available at <http://www.tampagov.net/contract-administration/programs/construction-project-bidding>.

Email Questions to: contractadministration@tampagov.net.

TABLE OF CONTENTS

BIDDING REQUIREMENTS

Notice to Bidders	N-1
Instructions to Bidders.....	I-1a thru I-4
Insurance Requirements.....	INS-1 thru INS-2
MBD Form 70	1 Page
WMBE-SLBE Availability Contact List.....	ACL-1
Availability Contact List Instructions	ACLI-1

BID FORMS

Proposal.....	P-1 thru P-3
Bidder's Criminal History Screening Practices	BTB-1
Good Faith Efforts Compliance Plan	GFCEP
SLBE Solicited	DMI – Solicited
SLBE Utilized.....	DMI – Utilized
Bid Bond	BB-1

CONTRACT FORMS

Agreement	A-1 thru A-14
Public Construction Bond	PB-1 thru PB-3

GENERAL PROVISIONS

General Provisions	G-1 thru G-10
Specific Provisions.....	SP-1 thru SP-26
Subcontractors Payment Form.....	DMI – Payments
Project Sign.....	Sign-1 thru Sign-2

WORKMANSHIP AND MATERIALS

Section 1 – Excavation - Earth and Rock	W1-1 thru W1-5
Section 2 – Backfilling.....	W2-1 thru W2-4
Section 4 – Concrete and Concrete Materials	W4-1 thru W4-6
Section 6 – Reinforcing Steel	W6-1 thru W6-4
Section 7 – Construction and Expansion Joints for Concrete	W7-1 thru W7-3
Section 8 – Metal Castings	W8-1
Section 9 – Structural and Miscellaneous Steel.....	W9-1 thru W9-3
Section 10 – Ductile Iron Pipe and Fittings	W10-1 thru W10-4
Section 11 – PVC Pipe Gravity.....	W11-1 thru W11-9
Section 12 – Precast Concrete Manholes.....	W12-1 thru W12-4
Section 15 – Laying and Jointing Pipe for Force Mains and Sewers	W15-1 thru W15-7
Section 16 – Restoration of Street Pavements	W16-1 thru W16-8
Section 17 – Lawn Replacement.	W17-1 thru W17-2
Section 18 – Leakage Tests	W18-1 thru W18-3
Section 20 – Maintaining Existing Sanitary Sewer in Operation	W20-1 thru W20-2
Section 24 – PVC Pipe - Force Main.....	W24-1 thru W24-4
Section 26 – Filling of Existing Sanitary or Storm Sewer System	W26-1 thru W26-2
Section 27 – Demolition	W27-1 thru W27-2

Section 30 – Miscellaneous Pipe and Fittings	W30-1 thru W30-2
Section 31 – Hangers and Supports	W31-1 thru W31-2
Section 32 – Valves	W32-1 thru W32-5
Section 33 – Leakage Tests - Pumping Stations	W33-1
Section 36 – Painting.....	W36-1 thru W36-5
Section 38 – Sewage Pumping Equipment.....	W38-1 thru W38-5
Section 45 – Electrical	W45-1 thru W45-2
Section 46 – Controls	W46-1 thru W46-11
Section 47 – Electric Motors	W47-1 thru W47-3
Section 48 – Heavy-Duty Double Throw Fusible Switch.....	W48-1 thru W48-4
Section 49 – Reduced Voltage Solid State Starter.....	W49-1 thru W49-2
Section 51 – Automatic Transfer Switch	W51-1 thru W51-8
Section 67 – Steel Pipe and Fittings	W67-1 thru W67-3
Section 72 – Television Inspection.....	W72-1 thru W72-3
Section 73 – Restraining Devices	W73-1 thru W73-2
Section 76 – Conduit, Wire, and Grounding.....	W76-1 thru W76-11
Section 345 – Portland Cement Concrete	W345-1 thru W345-18
Section 550 – Fencing Type B Vinyl Coated	W550-1 thru W550-4
Section 16216 – Diesel Engine Driven Generators with Weatherproof Enclosures	W16216-1 thru W16216-16
Section 17000 – Fiberglass Wetwell.....	W17000-1 thru W17000-4

APPENDIX A 109th Avenue Pump Station Asbestos & Lead Survey

NOTICE TO BIDDERS
CITY OF TAMPA, FLORIDA
Contract 23-C-00001; 109th Avenue Pump Station Rehabilitation

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., July 25, 2023, in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida, there to be publicly opened and read aloud.

The proposed work is to include, but not be limited to the replacement of the existing wet-dry pit pumping station with a more efficient, reliable and serviceable submersible pumping station. The project will include the installation of new pumps, piping, valves, and electrical and control systems. 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

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 109th Avenue Pump Station Rehabilitation in the City of Tampa, as required for a complete project, as shown on the plans and detailed in the specifications. The work is located on land owned or controlled by the City of Tampa.

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

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

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

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

I-1.04 INSTRUCTIONS TO BIDDERS

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

Proposals must be signed in ink by the Bidder with signature in full. When firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more partners. When a corporation is a bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office.

If the bidder referred to in Section I-2.07 is a corporation, it must submit; upon request, a copy of its filed Articles of Incorporation. In addition, if the bidder was incorporated in another state, it must establish that it is authorized to do business in the State of Florida. If the bidder is using a fictitious name, it must submit upon request, proof of registration of such name with the Clerk of the Circuit Court of the County where its principal place of business is. Failure to submit what is required is grounds to reject the bid of that bidder.

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

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

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.

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 365 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.

I-1.10 TESTING:

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

INSTRUCTIONS TO BIDDERS
SECTION 1 – SPECIAL INSTRUCTIONS

I-1.11 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):**
- 5% 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)
 - 8% 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 (GFECP) (MBD Form-50) for specific requirements.

GOOD FAITH EFFORT COMPLIANCE PLAN (GFECP) REQUIRED (MBD FORM-50). When a Goal has been established, the Bidder **must submit** with its bid a Good Faith Effort Compliance Plan (GFECP) 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 GFECP (post-bid) shall be only upon the City's request for clarification of information submitted with bid and **not to "cure" omissions or deficiencies** of the bid.

NOTE: 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 **GFECP 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-1.12 BID SECURITY:

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

I-1.13 PUBLIC CONSTRUCTION BOND:

The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be issued and executed by (a) surety company(ies) acceptable to the City and licensed to underwrite contracts in the State of Florida. After execution of the Agreement and before commencing work, the Contractor must provide the City a certified copy of the officially recorded Bond.

I-1.14 AGREEMENT

SECTION 2 – POWERS OF THE CITY’S REPRESENTATIVES, 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, 1st Paragraph, 1st Sentence:

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

SECTION 10 – PAYMENTS, Article 10.05, Page A-10, 1st Paragraph, 1st Sentence:

Change "...fair value of the work done, and may apply for..." to "...fair value of the work done, and shall apply for..." Note: Retainage as referenced in Article 10.05 is limited to a maximum of five percent (5%).

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.02, Page A-12, 1st Paragraph, 2nd Sentence:

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

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

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.03, 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 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.

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.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

Contractor agrees and recognizes that the City Indemnified Parties shall not be held liable or responsible for any Claims which may result from any actions or omissions of Contractor in which the City Indemnified Parties participated either through providing data or advice and/or review or concurrence of Contractor's actions. In reviewing, approving or rejecting any submissions by Contractor or other acts of Contractor, the City in no way assumes or shares any responsibility or liability of Contractor or any tier of subcontractor/subconsultant/supplier, under this Contract.

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

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.12, 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 or 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.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

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

E-Verify. In accordance with Section 448.095, Florida Statutes, the Contractor agrees to register with and utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired during the term of the Contract for the services specified in the Contract. The Contractor must also include a requirement in subcontracts that the subcontractor must register with and utilize the E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the Contract term. If the Contractor enters into a contract with a subcontractor, the subcontractor must provide the Contractor with an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an unauthorized alien. The Contractor shall maintain a copy of such affidavit for the duration of the Contract. If the City has a good faith belief that the Contractor has knowingly violated Section 448.09(1), Florida Statutes, the City shall terminate the Contract with the Contractor, and the Contractor may not be awarded a contract with the City for at least 1 year after the date on which the Contract was terminated. The Contractor is liable for any additional costs incurred by the City as a result of the termination of the Contract. If the City has a good faith belief that a subcontractor knowingly violated the law, but the Contractor has otherwise complied with the law, the City shall promptly notify the Contractor and order the Contractor to immediately terminate the contract with the subcontractor.

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

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

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

- I-1.17 PAYMENT DISPUTE RESOLUTION

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

- I-1.18 SCRUTINIZED COMPANIES CERTIFICATION

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

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

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-1.19 FLORIDA'S PUBLIC RECORDS LAW; DATA COLLECTION

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

I-1.20 APPRENTICESHIP REQUIREMENTS AND REPORTING FORM

Bidders shall comply with the conditions of the Apprenticeship Requirements and Reporting Form, Ordinance No. 2021-33, incorporated into the Contract and as specified therein.

I-1.21 BIDDER'S CRIMINAL HISTORY SCREENING PRACTICES

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

https://www.municode.com/library/fl/tampa/codes/code_of_ordinances

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

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 *****

ORDINANCE NO. 2021- 33

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44

AN ORDINANCE OF THE CITY OF TAMPA, FLORIDA, AMENDING CITY OF TAMPA CODE OF ORDINANCES CHAPTER 26.5 TO ADD "ARTICLE IV. APPRENTICE REQUIREMENTS IN CITY CONSTRUCTION CONTRACTS"; SECTIONS 26.5-211 THROUGH 26.5-216; TO ESTABLISH REQUIREMENTS PERTAINING TO THE USE OF APPRENTICE LABOR IN CERTAIN CITY OF TAMPA CONSTRUCTION PROJECTS, TO INCLUDE SPECIFIC EXCEPTIONS THERETO; TO PROVIDE CONDITIONS RELATING TO DOCUMENTATION, INCENTIVE FOR COMPLIANCE, FEE FOR NONCOMPLIANCE AND OTHER REMEDIES, IMPLEMENTATION, EXPANSION OF SCOPE AND REPORTING; REPEALING ALL ORDINANCES OR PARTS OF ORDINANCES IN CONFLICT THEREWITH; PROVIDING FOR SEVERABILITY; PROVIDING AN EFFECTIVE DATE.

WHEREAS, construction contractors in the City of Tampa have identified a shortage of skilled labor for construction projects and a need to train younger workers as the existing job force ages; and

WHEREAS, this shortage of labor could result in delays, expenses, and other challenges to the City's future construction projects; and

WHEREAS, the City of Tampa has determined that apprenticeships create opportunities for training and experience that will assist in ensuring that a trained workforce will be available for future City construction projects; and

WHEREAS, requiring the employment of apprentices on certain City of Tampa construction projects will promote business and economic development by increasing the number of skilled workers in the City; and

WHEREAS, the City of Council of the City of Tampa has determined that the creation of Chapter 26.5, Article IV, pertaining to Apprentice Requirements in City Construction Projects, is appropriate and in the interest of the public health, safety or welfare of the City of Tampa at this time; and

WHEREAS, duly noticed public hearings, as required by law, were held by the City Council of the City of Tampa at which all residents and interested persons were given an opportunity to be heard.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

NOW, THEREFORE,

**BE IT ORDAINED BY THE CITY COUNCIL
OF THE CITY OF TAMPA, FLORIDA:**

Section 1. That the recitals set forth above are hereby incorporated as if fully set forth herein.

Section 2. That the City of Tampa Code, Section 26.5, is hereby amended by creating Article IV, Sections 26.5-211 through 26.5-216, to read as follows:

"ARTICLE IV.- APPRENTICE REQUIREMENTS IN CITY CONSTRUCTION CONTRACTS

DIVISION 1. - IN GENERAL

Sec 26.5-211. – Title; Applicability.

This Article IV shall be known and may be cited as the "City of Tampa Apprentice Requirements in City Construction Contracts Ordinance". This Article shall apply to contracts for certain City of Tampa construction projects as specified in more detail herein.

Sec. 26.5-212. Legislative Findings and Intent.

(a) There is a shortage of skilled labor for construction projects and a need to train younger workers as the existing job force ages. This shortage of labor could result in delays, expenses, and other challenges to the City's future construction projects. Apprenticeships create opportunities for training and experience that will assist in ensuring that a trained workforce will be available for future City construction projects. By requiring contactors to use apprentices for City construction contracts, it is the intent of the City to increase the number of apprentices used by contractors, creating opportunities that will enable these apprentices to develop into more skilled labor that will then be available for City construction projects.

(b) Apprenticeship programs are recognized as an effective means of providing training and experience to individuals seeking to enter or advance in the workforce, offering an opportunity to earn wages while acquiring valuable marketable skills. The training that apprentices receive on city projects will also help them to market their skills to other contractors. In this way, apprenticeship training helps create a skilled pipeline of talent to support and sustain ongoing economic development activities in the City of Tampa.

Sec.26.5-213. - Definitions.

Apprentice means any person who is enrolled in and participating in an apprenticeship program or on-the-job training program registered with the Florida Department of Education or the United States Department of Labor, or in

1 a registered on-the-job training program, as defined in Chapter 446, Florida
2 Statutes.

3 *Bidder* means any individual, firm, corporation, partnership, company,
4 association, joint venture, or other entity that seeks the award of a construction
5 contract.

6 *Contractor* means any individual, firm, corporation, partnership, company,
7 association, joint venture, or other entity that has a construction contract with the
8 City.

9 *Construction contract*, for purposes of this article, means a contract
10 between the City and a contractor for a vertical construction project, as defined
11 herein. By no later than one year after implementation of this ordinance, this
12 definition shall be expanded to include horizontal construction projects, as also
13 defined herein.

14 *Vertical construction project* means a project, funded by City dollars in an
15 amount of at least one million dollars (\$1,000,000) priced on the basis of a lump
16 sum/fixed price amount, that involves the process of building, altering, repairing,
17 improving, or demolishing any public structure or building, or other public
18 improvements of any kind that are predominantly vertical (i.e., above-ground), on
19 or to any real property owned or under the control of the City, which work is being
20 performed under a construction contract. For purposes of this article, vertical
21 construction also includes on-site horizontal work that is integral to or part of the
22 vertical construction project.

23 *Horizontal construction project* means a project, funded by City dollars in
24 an amount of at least one million dollars (\$1,000,000) priced on the basis of a
25 lump sum/fixed price amount, that involves construction of highways, roads,
26 streets, bridges, utilities, water distribution or transmission pipelines, wastewater
27 interceptors, force mains or collection systems, and stormwater conveyance
28 facilities. For purposes of this article, horizontal construction also includes
29 rehabilitation of water, wastewater and stormwater pipelines including, but not
30 limited to, cured-in place, pulled-in place and pipe bursting methods.

31 *Good faith effort* means that the contractor, without an intent to defraud
32 or seek an unfair advantage, took all necessary steps to secure and maximize,
33 consistent with the requirements of this section, the required percentage for
34 apprentices on a construction project, to the satisfaction of the City of Tampa.
35 The contractor shall provide evidence of good faith efforts for consideration by
36 the City, which evidence may include documentation of the contractor's contacts

1 with the Florida Department of Education, Division of Career and Adult
2 Education's Apprenticeship Section; documentation of its contacts with state-
3 approved training programs, with labor organizations, and/or with technical
4 schools and training schools; documentation of its use of job fairs and other
5 outreach efforts; the frequency and duration of any employment advertisements
6 for apprentices; the extent to which the size of a contractor's workforce affects its
7 hiring opportunities for apprentices; and any other evidence demonstrating to the
8 satisfaction of the City that the contractor made a good faith attempt to secure
9 apprentice labor.

10 *Subcontractor* means an entity or individual providing services to the City
11 through a contractor for all or any portion of the construction contract.

12 *Labor hours* means the total hours worked on the site of a construction
13 project by workers who are employed by contractors or subcontractors on the
14 construction project, excluding hours worked by forepersons, superintendents, or
15 owners. Notwithstanding the above, the percentage requirements of this article
16 shall apply to the labor hours performed in a trade(s) for which registered
17 apprenticeship programs or on-the-job training programs exist.

18 **Sec. 26.5-214. - Apprenticeship Requirements and Exceptions.**

19 (a) When responding to a City of Tampa solicitation for a vertical construction project, a
20 bidder must certify that:

- 21 (1) The bidder or its subcontractors participate in an apprenticeship program that is
22 registered with the Florida Department of Education or the United States
23 Department of Labor; or
24 (2) The bidder commits that at the time the bidder executes a construction contract,
25 it or its subcontractors will be participating in an apprenticeship program that is
26 approved by the Florida Department of Education or the United States
27 Department of Labor or an on-the-job training program; or
28 (3) The bidder has submitted documentation that confirms, to the satisfaction of the
29 City of Tampa, that there are no registered apprenticeship or on-the-job training
30 programs for any type of work to be performed on the construction project.

31 (b) Prior to the City entering a construction contract, the City must receive
32 documentation from the bidder verifying compliance with Section 26-214(a).

33 (c) For the duration of the construction contract, as same may be extended including
34 through the issuance of change orders, at least 12% of the labor hours performed in
35 a trade(s) for which registered apprenticeship programs or on-the-job training
36 programs exist, including all work performed pursuant to change orders, must be

1 performed by apprentices employed by the contractor or subcontractors, with
2 required documentation provided to the City as set forth in Sec. 26-215 herein.

3 (d) If the contractor is unable to achieve or maintain the required percentage, the
4 contractor must notify the City in writing and document its good faith effort, as
5 defined herein, made to achieve or maintain the required percentage. The City will
6 then determine whether the contractor made all required good faith effort by
7 evaluating the contractor's submitted documentation.

8 (e) The construction contract between the City and the contractor must include a
9 provision requiring the contractor and its subcontractors to comply with the
10 requirements of this article.

11 (f) Exceptions.

12 (1) This article will not apply if:

13 a. It is prohibited by or in conflict with federal or state law or the terms of a
14 federal or state grant applicable to the construction project; or

15 b. The Mayor or the Mayor's designee determines that emergency
16 circumstances exist such that applying the article to the construction project
17 is not in the best interest of the City.

18 (2) This article will not apply to a subcontractor that is a WMBE or SLBE if the
19 compensation to be paid under the applicable subcontract for labor costs is less
20 than \$1,000,000.

21 (3) The twelve percent (12%) requirement of labor hours on the construction
22 project that must be performed by apprentices may be reduced by the Mayor or
23 the Mayor's designee if:

24 a. The contractor has successfully demonstrated to the City, after making a
25 good faith effort as defined herein, that the contractor has been unable to
26 find, or there does not exist, a sufficient number or type of apprentices
27 available to meet the required percentage; or

28 b. The Mayor or the Mayor's designee determines that there exists, for the
29 construction project at issue, a disproportionately high ratio of material
30 costs to labor hours, which makes infeasible the required percentage of
31 apprentice participation.

32
33 **Sec. 26.5-215. - Required Documentation, Incentive for Compliance, and**
34 **Noncompliance Fee and Other Remedies.**

35
36 (a) *Required documentation.* The contractor must prepare, submit, and certify, on a
37 monthly basis for the duration of the construction contract, accurate and timely
38 records, on a form prepared by the City, identifying the name, hourly rate, and trade
39 classification of each apprentice, the cumulative number of hours worked on the

1 project to date by apprentices, and the labor hours of all workers used by the
2 contractor and each subcontractor on the construction project. If a subcontractor
3 uses apprentices that will be included to satisfy the 12% requirement set forth herein,
4 the contractor must require that the subcontractors prepare, maintain, and certify,
5 for submittal by the contractor to the City, accurate and timely records, on a form
6 prepared by the City, identifying for such subcontractor, the name, hourly rate, trade
7 classification, labor hours for apprentices used by the subcontractor on the
8 construction project, and labor hours of all workers used by the subcontractor on the
9 construction project.

10 (b) *Incentive for Compliance.* At the point at which a contract is 50% complete, the City
11 will reduce 1% of the retainage, provided the City has determined that (i) the
12 contractor is in compliance with the percentage requirements of subsection 26.5-
13 214(c) for the work performed to date, and (ii) is otherwise performing its contract
14 obligations to the full satisfaction of the City.

15 (c) *Fee for Partial Compliance or Noncompliance.* Contracts for all projects to which these
16 requirements apply will provide that if a contractor fails to fully comply with the
17 percentage requirements of subsection 26.5-214(c), and the requirement is not
18 adjusted in writing by the Mayor or the Mayor's designee, as provided for above, the
19 contractor will be assessed a penalty fee amount for each hour that is not achieved.

20 1. The amount per hour shall be based on the extent to which the contractor or
21 subcontractor met the 12% labor hour requirement. The fee schedule for the
22 amount per hour that will be assessed shall be adopted by Resolution.

23 2. The assessments imposed shall be deducted from the contractor's final pay
24 application and shall be utilized to support construction/building trade apprentice
25 training programs registered with the State of Florida or the United States
26 Department of Labor and located within Hillsborough County, and/or such
27 apprentice training programs provided by the Hillsborough County School District.

28 (d) *Noncompliance-Other Remedies.* Failure of a contractor to comply with the
29 requirements of this article may subject the contractor to all remedies available to the
30 City at law, including but not limited to debarment or suspension of the contractor
31 from consideration for the award of future contracts, and termination of the
32 construction contract.

33 **Sec. 26.5-216.- Implementation, Expansion of Scope to include Horizontal Construction,**
34 **and Reporting.**

35 (a) *Implementation.* The Mayor or the Mayor's designee shall implement the provisions
36 of this ordinance no later than six months from its effective date.

37 (b) *Expansion of the Scope of the Apprentice Requirements to apply to Horizontal*
38 *Construction.* By no later than twelve months after implementation of this ordinance,
39 this article shall be amended as necessary to expand its application to horizontal
40 construction contracts, as defined herein.

1 (c) *Reporting.* At six month intervals during the first year after implementation of this
2 article, and thereafter on an annual basis, the Mayor or the Mayor's designee shall
3 prepare a report to be presented on the agenda of the City Council, that includes for
4 each contract to which this article applies, a line item breakdown of: the name of the
5 contractor, the name or description of the construction project, the total dollar value
6 of the construction project, the number of apprentices hired for the construction
7 project, the number of apprentice hours worked on the construction project, and the
8 total labor hours expended on the construction project. Additionally, the report will
9 identify any contracts where the 12% requirement was not met, and the reason; a
10 report on outreach efforts made by the City Council and the City Administration, along
11 with any other relevant details or recommendations regarding the City's
12 apprenticeship requirements that the Mayor or the Mayor's designee wish to include.

13
14 **Section 3.** That all ordinances or parts of ordinances in conflict herewith are repealed
15 to the extent of any conflict with the terms of this ordinance.

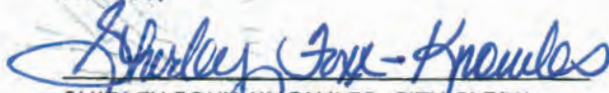
16
17 **Section 4.** That if any part of this Ordinance shall be declared unconstitutional or
18 invalid by a court of competent jurisdiction, the remaining provisions shall remain in full
19 force and effect.

20
21 **Section 5.** Except to the extent expressly addressed herein, this Ordinance shall take
22 effect immediately upon becoming a law.


23
24
25 PASSED AND ORDAINED BY THE CITY COUNCIL OF THE CITY OF TAMPA,
26 FLORIDA, ON March 18, 2021.

27
28
29 
30 _____
31 CHAIRMAN/CHAIRMAN PRO-TEM,
32 CITY COUNCIL

33 ATTEST;

34 
35 _____
36 SHIRLEY FOXX-KNOWLES, CITY CLERK

37
38 APPROVED BY ME ON 3/22/21

39
40 
41 _____
42 JANE CASTOR, MAYOR
43

1
2
3
4
5
6
7
8
9

Approved as to Legal Sufficiency:

ANDREA ZELMAN, DEPUTY CITY ATTORNEY

K:\AEZ\Apprentice Ordinance\Apprentice Ordinance 2.16.2021.docx

RESOLUTION 2021 - 527

RESOLUTION ESTABLISHING A SCHEDULE OF FEES FOR PARTIAL COMPLIANCE OR NONCOMPLIANCE WITH APPRENTICE LABOR HOUR PERCENTAGE REQUIREMENTS PURSUANT TO CHAPTER 26.5, ARTICLE IV, APPRENTICE REQUIREMENTS IN CITY CONSTRUCTION CONTRACTS, SUBSECTION 26.5-215(c)1, OF THE CITY OF TAMPA CODE; PROVIDING AN EFFECTIVE DATE.

WHEREAS, on March 18, 2021, City Council adopted Ordinance No. 2021-33, which added Chapter 26.5, Article IV., Apprentice Requirements in City Construction Projects, Sections 26.5-211 through 26.5-216, to the City of Tampa Code (the "Apprentice Ordinance"); and

WHEREAS, Subsection 26.5-215(c) provides for the assessment of a fee for partial compliance or noncompliance with the apprentice labor hour percentage requirements of subsection 26.5-214(c), with the fee amount to be based on the extent to which the contractor or subcontractor met the apprentice labor hour requirements under the ordinance; and

WHEREAS, Subsection 26.5-215(c)1. provides for the adoption of a fee schedule by Resolution; and

WHEREAS, the fees established pursuant to this Resolution are reasonable and are consistent with the purpose, intent and express requirements of the Apprentice Ordinance.

NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF TAMPA, FLORIDA:

Section 1. That pursuant to the authority of Section 26.5-215(c)1., the following is the schedule of fees for partial compliance or noncompliance with the apprentice labor hour requirements of subsection 26.5-214(c), City of Tampa Code:

Percent of goal met	Assessment per unmet hour
100%	\$0.00
90% to 99%	\$2.50
75% to 89%	\$5.25
50% to 74%	\$8.00
1% to 49%	\$11.25
0%	\$15.00

Section 2. That the proper officers of the City of Tampa are hereby authorized and directed to do all things necessary and proper in order to carry out and make effective the provisions of this resolution.

Section 3. That this Resolution shall take effect immediately upon its adoption.

PASSED AND ADOPTED BY THE CITY COUNCIL OF THE CITY OF TAMPA,
FLORIDA, ON JUL 15 2021.



CHAIRMAN/CHAIRMAN PRO-TEM
CITY COUNCIL

ATTEST:



CITY CLERK/DEPUTY CITY CLERK

PREPARED BY AND APPROVED
AS TO LEGAL SUFFICIENCY:

 e/s
ANDREA E. ZELMAN
DEPUTY CITY ATTORNEY

City of Tampa - Apprenticeship / OJT Progress Report

Contract: No.; _____ Name; _____

Pay App. # _____

Designated Trade For Which Apprenticeship Program(s) Are Available: _____

Use a separate form for each applicable trade.

Apprentice/OJT Employee Name	Apprenticeship / OJT Program	Hourly Rate	Cumulative Hours Worked To Date

Total Apprentice & OJT Hours

Total Non-Supv. Labor Hours For Designated Trade

Percent AppOJT/ Non-Supv. Labor

Remarks:

Certified by: _____

Name/Title/Date: _____

Firm Name: _____

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 ¹

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

¹ "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.

Procurement Guidelines To Implement Minority & Small Business Participation

Underutilized WMBE Primes by Industry Category

FORMAL PROCUREMENT	Construction	Construction-Related	Professional	Non-Professional	Goods
	Black	Asian	Black	Black	Black
	Hispanic	Native Am.	Hispanic	Asian	Hispanic
	Native Am.	Woman	Asian	Native Am.	Asian
	Woman		Native Am.		Native Am.
			Woman		Woman

Underutilized WMBE Sub-Contractors / Sub-Consultants

SUB WORK	Construction	Construction-Related	Professional	Non-Professional	Goods
	Black	Black	Black	Black	Black
		Asian	Hispanic	Asian	Asian
		Native Am.	Asian	Native Am.	Native Am.
		Woman	Native Am.		Woman
			Woman		

Policy

The Guidelines apply to formal procurements and solicitations. WMBE participation will be narrowly-tailored.

Index

- Black = Black/African-American Business Enterprise
- Hispanic = Hispanic Business Enterprise
- Asian = Asian Business Enterprise
- Native Am. = Native American Business Enterprise
- Woman = Woman Business Enterprise (Caucasian)

Industry Categories

Construction is defined as: new construction, renovation, restoration, maintenance of public improvements and underground utilities.

Construction-Related Services are defined as: architecture, professional engineering, landscape architecture, design build, construction management services, or registered surveying and mapping.

Professional Services are defined as: attorney, accountant, medical doctor, veterinarian, miscellaneous consultant, etc.

Non-Professional Services are defined as: lawn maintenance, painting, janitorial, printing, hauling, security guard, etc.

Goods are defined as: all supplies, materials, pipes, equipment, machinery, appliances, and other commodities.

MBD Form-70

**FY23 109th Avenue Pump Station Rehabilitation
Wastewater Department
FY 23 Project 23-C-00001
SLBE Availability Contact List**

#'s	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	Cert. Type	Ethnicity
2	Aguila Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguilaelectrical.com	5708 N56TH ST	Tampa	FL	33610			SLBE	Hispanic American
2	All-In-One Electric, Inc.	813-849-6331	813-514-0473	ijones@aioelectric.com	1201 W. WATERS AVENUE	TAMPA	FL	33604			SLBE	African American
2	Green Earth Commercial Contracting Company	813-323-3406		info@gec-3.com	3903 Northdale Blvd. Suite 130W	Tampa	FL	33634			SLBE	Hispanic American
2	Harmonics Electric LLC	813-767-7722		hrod@harmonicelectric.com	14523 Knoll Ridge Dr	Tampa	FL	33625			SLBE	Hispanic American
2	Leading Choice Electric LLC	813-508-7585		leadingchoicellectric@gmail.com	13014 N Dale Mabry Hwy #364	Tampa	FL	33618			SLBE	Hispanic American
2	One Call Construction Services Inc.	813-270-4105	888-655-0862	occsinc@aol.com	6600 32nd Ave. S.	Tampa	FL	33619			SLBE	Hispanic American
2	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atruijill@tampabay.rr.com	P.O. Box 579	Seffner	FL	33583			SLBE	Hispanic American
3	CARJA CONSTRUCTION, INC	813-304-7158		carly@puleosconcrete.com	2010 chickwood ct	Tampa	FL	33618			SLBE	Caucasian
3	H.B. Underground Inc	813-455-5815		hugo726b@gmail.com	11500 N Dale Mabry Hwy, Apt 1713	Tampa	FL	33618			SLBE	Hispanic American
3	JMJ Site Development Inc	813-927-2484		jmjsitedevelopment@gmail.com	16350 Bruce B Downs Boulevard, Unit #48167	Tampa	FL	33647			SLBE	Caucasian
3	Paragon Building Contractors, Inc.	813-373-3154	813-435-2289	jeriel.davis@gmail.com	2019 east Hanna Avenue	TAMPA	FL	33604			SLBE	African American
3	Sunrise Utility Construction, Inc.	813-949-3749	813-949-0408	lmnboss@aol.com	P.O. Box 272293	Tampa	FL	33688			SLBE	Caucasian

**FY23 109th Avenue Pump Station Rehabilitation
Wastewater Department
FY 23 Project 23-C-00001
SLBE Availability Contact List**

#'s	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	Cert. Type	Ethnicity
4	MBE Supply of Florida, Inc.	813-781-6583		mbsupplyofflorida@gmail.com	P. O. Box 270037	Tampa	FL	33688			SLBE	Caucasian
4	SUCA Pipe Supply Inc.	813-249-7902		slmau44@yahoo.com	P. O. Box 272482	Tampa	FL	33688			SLBE	African American
4	Suca Pipe Supply, Inc. One	813-249-7902		mactwinau1@yahoo.com	4910 Lowell Road	Tampa	FL	33624			SLBE	African American
4	TLD LLC	813-927-7554	813-977-5419	tid2013@verizon.net	14512 N. Nebraska Avenue	Tampa	FL	33613			SLBE	Caucasian
5	Abacron LLC	813-539-8087		abacronllc@gmail.com	27251 Wesley Chapel Blvd #110	Wesley Chapel	FL	33544			SLBE	African American
5	Broxton & Broxton Contracting LLC	813-732-7730	813-000-0000	broxtonandbroxton@gmail.com	10107 N 14th Street	Tampa	FL	33612			SLBE	African American
5	Federico's Painting Corp	813-908-1404	813-908-1404	adelapav50@hotmail.com	6615 Winding Oak Dr.	Tampa	FL	33625			SLBE	Hispanic American
5	Finest Touch Commercial Painting and Cleaning, LLC	813-468-8628		angee@finesttouchpaint.com	701 s howard ave	Tampa	FL	33606			SLBE	Hispanic American
5	Green Earth Commercial Contracting Company	813-323-3406		info@gec-3.com	3903 Northdale Blvd. Suite 130W	Tampa	FL	33634			SLBE	Hispanic American
5	Jackys Cleaning Services, LLC	813-517-6077		info@jackysteph.com	8714 Exposition Dr	Tampa	FL	33626			SLBE	Hispanic American
5	POD-NC LLC	844-724-6870		frankn@podnc.com	8900 N Armenia Ave- Suite 228	Tampa	FL	33604			SLBE	Hispanic American
6	7 Shepards Investments, LLC	813-416-0484	813-991-0304	sevenshepardsinvestmentsllc@yahoo.com	10408 Goldenbrook Way	Tampa	FL	33647			SLBE	African American
6	Always Green Landscaping Inc.	813-516-0823		alwaysgreenlandscapinginc@gmail.com	6501 Sawyer Court	Tampa	FL	33634			SLBE	Hispanic American

**FY23 109th Avenue Pump Station Rehabilitation
Wastewater Department
FY 23 Project 23-C-00001
SLBE Availability Contact List**

#'s	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	Cert. Type	Ethnicity
7	BUN Construction Co., Inc.	813-931-8270	813-931-9185	bunconstruction@tampabay.fl.com	4135 E. Hillsborough Avenue	Tampa	FL	33610			SLBE	African American
7	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelopment@yahoo.com	5508 N 50th St, suite 18	Tampa	FL	33610			SLBE	African American
7	JEB Management, Inc.	813-968-1921	813-241-6070	info@fence4u.biz	5804 N. Occident Street	Tampa	FL	33614			SLBE	Caucasian

**FY23 109th Avenue Pump Station Rehabilitation
Wastewater Department
FY 23 Project 23-C-00001**

**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	Ethni
2	All-in-One Electric, Inc.	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W. WATERS AVENUE	TAMPA	FL	33604			BBE	African American
3	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelop@yahoo.com	5508 N 50th St, suite 18	Tampa	FL	33610			BBE	African American
3	Paragon Building Contractors, Inc.	813-373-3154	813-435-2289	jeriel.davis@gmail.com	2019 east Hanna Avenue	TAMPA	FL	33604			BBE	African American
4	Aviman Management, LLC	302-377-5788	302-543-7403	levi@avimanmanagement.com	550 N Reo Street, Suite 300	Tampa	FL	33609			BBE	African American
4	SUCA Pipe Supply Inc.	813-249-7902		simau44@yahoo.com	P.O.Box 272482	Tampa	FL	33688			BBE	African American
4	Suca Pipe Supply, Inc. One	813-249-7902		mactwinau1@yahoo.com	4910 Lowell Road	Tampa	FL	33624			BBE	African American
5	Abacron LLC	813-539-8087		abacronllc@gmail.com	27251 Wesley Chapel Blvd #110	Wesley Chapel	FL	33544			BBE	African American
5	Broxton & Broxton Contracting LLC	813-732-7730	813-000-0000	broxtonandbroxton@gmail.com	10107 N 14th Street	Tampa	FL	33612			BBE	African American
6	7 Shepards Investments, LLC	813-416-0484	813-991-0304	sevenshepardsinvestmentsllc@yahoo.com	10408 Goldenbrook Way	Tampa	FL	33647			BBE	African American
6	Amplified Property Services	863-904-9516		amplifiedps@yahoo.com	1710 w dempsey ave	Tampa	FL	33603			BBE	African American
6	BUN Construction Co., Inc.	813-931-8270	813-931-9185	bunconstruction@tampabay.rr.com	4135 E. Hillsborough Avenue	Tampa	FL	33610			BBE	African American
6	Cultiv8 Landscape Services LLC	813-220-8212	813-750-2867	mulcheverywhere@gmail.com	14002 Arbor Knoll Cir	Tampa	FL	33625			BBE	African American
6	Cut-Ups Lawn Service	813-361-8871	813-238-2397	cutupslawnservice@yahoo.com	3217 East Powhatan Ave.	Tampa	FL	33610			BBE	African American

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

FY23 109th Avenue Pump Station Rehabilitation
 Wastewater Department
 FY 23 Project 23-C-00001

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	FEN	Cert. Type	Ethnicity
6	Real Deal McNeal Landscaping LLC	813-317-4108		mcdonald24@gmail.com	2606 E 25th Ave	Tampa	FL	33605			BBE	African American
6	T. C. C Enterprise Inc	813-606-9148	813-237-0396	tcc_inc@live.com	3902 E POWHATAN AVE	TAMPA	FL	33610			BBE	African American
6	Williams Landscape Management Co., Inc.	813-628-8048	813-628-8041	tonywilliams@wfmsiandscape.com	5710 N 50th St	Tampa	FL	33610			BBE	African American
7	BUN Construction Co., Inc.	813-931-8270	813-931-9185	bunconstruction@tampabay.rr.com	4135 E. Hillisborough Avenue	Tampa	FL	33610			BBE	African American
7	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelop@yahoo.com	5508 N 50th St, suite 18	Tampa	FL	33610			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.

Contract 23-C-00001; 109th Avenue Pump Station Rehabilitation

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: (____) _____

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) For bids \$1,000,000 and over; The Bidder or its subcontractors participate in an apprenticeship program that is registered with the Florida Department of Education or the United States Department of Labor; or Bidder commits that at the time it executes a construction contract that it or its subcontractors will be participating in such an apprenticeship program or an on-the-job training program; or Bidder has submitted documentation that confirms, to the satisfaction of the City of Tampa, that there are no registered apprenticeship or on-the-job training programs for any work to be performed on the construction project.
- (11) 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.

Contract 23-C-00001; 109th Avenue Pump Station Rehabilitation

Contract Item No.	Unit	Estimated Quantity	Description and Price in Words	Computed Total Price for Item in Figures
BASE BID	LS		The work includes the furnishing of all labor, equipment, and material for the replacement of the existing wet-dry pit pumping station with a more efficient, reliable and serviceable submersible pumping station including but not limited to, the installation of new pumps, piping, valves, and electrical and control systems and all appurtenant work, in accordance with the Contract Documents.	
			_____ _____ dollars and _____ cents	
ITEM 2	LS	1	BASE BID LS Contingency	\$ _____ \$ <u>100,000.00</u>
			TOTAL	\$ _____

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:

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

Accompanying this Proposal is a certified check, cashier's check or Tampa Bid Bond (form included herein must be used) for at least five percent (5%) of the total amount of the Proposal which check shall become the property of the City, or which bond shall become forthwith due and payable to the City, if this Proposal shall be accepted by the City and the Bidder shall fail to enter into a legally binding contract with and to furnish the required Public Construction Bond to the City within twenty (20) days after the date of its receipt of written Notice of Award by the City so to do.

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

[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 RFQ/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



Page 2 of 4 – DMI Solicited/Utilized

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 23-C-00001; 109th Avenue Pump Station Rehabilitation

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 23-C-00001, 109th Avenue Pump Station Rehabilitation.

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 23-C-00001 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 23-C-00001; 109th Avenue Pump Station Rehabilitation, shall include, but not be limited to, The project will replace the existing wet-dry pit pumping station with a more efficient, reliable and serviceable submersible pumping station. The project will include the installation of new pumps, piping, valves, and electrical and control systems 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 or 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

Jane Castor, Mayor
(SEAL)

ATTEST:

City Clerk

Approved as to Form:

The execution of this document was authorized
by Resolution No. _____

Justin R. Vaske E/S
Justin R. Vaske, Senior Assistant City Attorney

Contractor

By: _____
(SEAL)

Title:

ATTEST:

Witness

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

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

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

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

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

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

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

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

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

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

Signed _____

Date _____

Name _____

Title _____

Firm _____

Project _____

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 Justin R. Vaske E/S
Justin R. Vaske, Senior 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.

SPECIFIC PROVISIONS

SP-1.P Scope

All work shall be constructed, installed and maintained complete in place as specifically described in these Specifications, as shown on the Plans and as described and directed by the City in accordance with the obvious or expressed intent of the Contract.

This work also includes general cleanup, start-up and testing of all installed equipment to ensure satisfactory operation of the facility and all other work required by the Contract Documents necessary to make the facility complete and functional to serve its intended purpose.

SP-2 Permits

The Contractor will obtain permits required from any State or County agencies having jurisdiction over the roadways and for any railroad or highway crossings shown on the Plans. The Contractor shall be required to comply with all provisions of such permits regarding workmanship, schedules, maintenance of traffic, and notification of starting construction, pavement removal and replacement and other conditions under which the permit is issued.

The City will obtain the Florida Department of Environmental Protection (FDEP) Permit for Constructing a Domestic Wastewater Collection/Transmission System, currently administered by Hillsborough County Environmental Protection Commission (EPC).

The Contractor shall obtain all permits required to comply with SP-4.C Maintenance of Traffic, contained herein.

The Contractor shall have in his possession the proper license to perform the work before submittal of his bid and shall obtain any required City/County building permits and shall obtain and pay for all other licenses and authorizations required for the prosecution of the work, including the cost of all work performed in compliance with the terms and conditions of such permits, licenses and authorizations, whether by himself or others.

City/County building permit fees will be paid by the City. The City will submit to Construction Services Division for building permit.

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

The Contractor is responsible to schedule and coordinate with the City Construction Services Division of the Planning and Development Department all required inspections and tests for all phases of work to obtain final approval thereof.

The Contractor is encouraged to contact the City's Construction Services Division prior to commencement of work to ascertain their respective requirements.

SP-3 Demolition Permits

The Contractor will obtain demolition permits required from agencies having jurisdiction over the complete or partial demolition of a structure shown on the Plans. The Contractor shall be required to comply with all provisions of such permits regarding workmanship, schedules, inspections, notifications (Tampa Electric, Verizon, EPC, etc.) and other conditions under which the permit is issued. All costs associated with permit applications, inspections, and notifications is the responsibility of the contractor.

Asbestos and lead surveys were conducted at 109th Avenue Pump Station (provided in Appendix A). Survey results indicate no asbestos is present in the structures. Survey results indicate lead paint is present in both structures at various locations. Contractor to conduct operations in such locations as to comply with applicable regulations. In the event during the performance of the work asbestos is discovered, the Contractor shall stop work and coordinate with the Engineer and the City for appropriate remediation with a commensurate adjustment to the contract price and time.

The Contractor is responsible to schedule and coordinate with all agencies having jurisdiction for all required inspections and tests for all phases of work to obtain final approval thereof.

SP-4.C Maintenance of Traffic

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

If required by the project scope of work, at least three weeks before starting any work in City streets, the Contractor shall obtain a City of Tampa Street Closure Permit for any traffic lane or street closure within the City through the Accela portal at the following website.

<https://aca.tampagov.net/>

If required by the project scope of work, at least three weeks before starting any work in County streets, the Contractor shall obtain a Hillsborough County Temporary Traffic Control Street Closure Permit for any traffic lane or street closure within the County through the Hillsborough County portal at the following website.

<https://www.hillsboroughcounty.org/en/businesses/permits-and-records/permits/action-folder/apply-for-a-temporary-traffic-control-permit>

The permit will establish the requirements for closures related to the number of lanes and time of day lanes or streets may be closed. If the Contractor proposes a complete street closure, a detailed traffic maintenance plan shall be submitted to the City of Tampa Planning and Development Department or the Hillsborough County Traffic Control Department, together with the application for the Street Closure Permit. The traffic maintenance plan shall include proposed detour routes and locations and descriptions of direction signs for the construction area and detour routes. Two approved copies of all Street Closure Permits shall be submitted to the Engineer before starting any work in City streets. No changes to approved Street Closure Permits will be permitted without prior approval by the City.

The Contractor shall furnish and maintain all necessary signs, barricades, lights and flagmen

necessary to control traffic and provide for safety to 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.

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 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.

For all proposed road and lane closures for this project, the Contractor shall prepare and submit a Maintenance of Traffic (M.O.T.) plan detailing all proposed detoured traffic flow, signage and barricades to the City's Wastewater Department, Transportation and Stormwater Services Department and Construction Administration Construction Division for approval. The route of the proposed bypass piping shall also be reflected on the MOT plans. The Contractor shall be responsible for obtaining all road and lane closure permits from the City of Tampa, City of Tampa Planning and Development Department or the Hillsborough County Traffic Control Department. Where applicable, MOT(s) shall conform to appropriate FDOT Traffic Control Drawings contained in the FDOT Design Standards (600 Series Index Numbers), most current edition.

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.

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-7 Use of Explosives

Explosives will not be used on the work except when authorized by the City. The use of same, if authorized, shall conform to laws or ordinances which may pertain to the use of same and the utmost care will be exercised by the Contractor so as not to endanger life or property. The Contractor will assume full responsibility in connection with use of any explosives even though authorized. Explosives will not be stored within the City limits.

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 or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-11 Construction Easements

In the event that, in the opinion of the Contractor, obtaining a temporary construction easement is necessary or desirable, it shall be the sole responsibility of the Contractor to obtain such easements from the Owner of the property. If such easements are obtained by the Contractor, they shall contain provisions to hold the City harmless from any operations of the Contractor within the easement limits. The Contractor shall not conduct construction operations on private property outside the limits of any easement obtained by the City or of any City-owned right-of-way unless a copy of the temporary construction easement agreement is filed with the Engineer.

SP-12 Releasing Facilities for Use

It is 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 he 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 City and Engineer for such purposes.

SP-15 Contractor's Field Office

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 City, 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 classified unit price Contract Items or in the total 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 which dewatering is incidental, or in the total Lump Sum Price, as applicable, and no separate payment will 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 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.

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-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, Dep Department of Transportation and Stormwater Services 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-27 Existing Public Facilities

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

SP-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, 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 on storm or sanitary sewer pipe items, and no separate payment shall be made therefor.

SP-33 Protection of Trees and Shrubs

All trees and shrubs, except where otherwise shown or ordered, shall be adequately protected by boxes, fences, or otherwise carefully supported, as necessary, by the Contractor. Protective barricades shall be placed around all protected trees and grand trees and shall remain in place until all potentially damaging construction activities are completed (see attached barricade detail). The Parks Department must inspect the site after tree protection devices have been installed and prior to construction. A 48-hour notice must be given to Parks Department to schedule the inspection. No excavated or backfill material shall be placed in a manner which, in the opinion of the Engineer, may result in damage to trees or shrubs. Prior to mobilization, all exposed roots shall be covered with a two (2)-inch layer of mulch. The Contractor shall replace all trees or shrubs which are destroyed or damaged to such extent, in the opinion of the Engineer, to be considered destroyed. Replacement of destroyed trees or shrubs shall be made with new stock conforming to the requirements of the City's Tree Ordinance at the expense of the Contractor, and no separate payment will be made therefor.

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

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

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

SP-35 Work in Private Property

Where portions of the work are constructed in easements through private properties, the limits of such City-owned easements are as shown on the Plans.

Upon completion of work in City-owned easements, the Contractor shall restore the property, including all fences or other structures disturbed by his operations, as nearly as possible to the condition in which it was found. No material shall be used or removed from private property without the approval of the Engineer.

The Contractor shall confine his operation in such private properties within the limits of the easements as shown or directed by the Engineer.

The Contractor shall further comply with all provisions of the grants of the City-owned easement and shall assume full responsibility as the agent of the City for all obligations of the City under such grants of easement in connection with the construction of pipelines.

The Contractor shall not enter upon or occupy any private land outside of the limits of the City-owned easement unless a copy of the written consent of the Owner is filed with the Engineer. The Contractor shall conduct his operations along easements through private property so as not to damage the property and to interfere with its ordinary use as little as possible.

SP-36 Fences

Temporary fences, where required, shall be "wood and wire fence" or other suitable fencing as approved by the Engineer.

Permanent fences shall be restored by the Contractor and shall be finished and installed so that the restoration is equal to the original. Only those portions of original fencing, or materials therefrom, that the Engineer approved for reuse shall be used by the Contractor in fence restoration. All other materials, including lumber, paint, creosote, concrete and metal products, shall be furnished by the Contractor.

The cost of temporary fences and permanent fence restoration 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.

SP-37 Data to be Submitted on Pipe

Within ten days after the date the Contractor is issued the Notice of Award and prior to his entering into any subcontract for the manufacture or purchase of any pipe, the Contractor shall submit to the Engineer, in an amount equal to four (4) sets to be retained by the City plus the number of sets desired by the Contractor, the following information:

1. The name and address of the pipe manufacturer and the location of the plant at which the pipe will be manufactured.
2. A general description of and specifications for the pipe and pipe joints proposed.
3. Notarized certificates of manufacture for VCP, PVC, HDPE, and DIP stating conformance to applicable standards and specifications.
4. Any additional information that the Engineer may deem necessary in order to evaluate the

qualifications of the manufacturer and to determine the suitability of the proposed pipe to meet the requirements of the Contract Documents.

The Contractor shall not enter into any subcontract for the furnishing of pipe until he has received the Engineer's approval, in writing, of the proposed manufacturer and pipe.

All pipe of specified classes and materials shall be of one kind and shall be produced by a single manufacturer.

SP-40 Concrete Requirements

Workmanship and Materials Section 345 shall apply to all concrete work, except that concrete work for sanitary sewer facilities shall comply with Workmanship and Materials Sections 4.

SP-46 Filling Abandoned Sewers

The Contractor shall pump a lean mixture of grout into sewers as shown on the Plans and as directed by the Engineer.

The grout shall be a mixture of flyash and cement, the ratio of which shall be submitted to the Engineer for approval. The grouting shall be carried out by pumps.

This work shall be carried out after the proposed sanitary sewer or storm sewer is functioning.

The Contractor shall take measures to ensure the pipe is completely filled with the grout. Such measures may consist of constructing temporary stand pipes, grout injection tubes, or other measures approved by the Engineer and as directed in the Workmanship and Materials Section 26. The Contractor shall also construct approved plugs into the ends of the abandoned sewers. All costs to construct the plugs, stand pipes, grout injection tubes (or other approved measures), and any other necessary steps to provide for a complete item shall be included in the Lump Sum and no additional payment shall be made therefor.

SP-49 Alignment Survey Gravity Pipe Sewer or Force Main

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

The Land Surveyor shall also establish construction centerline offset hubs at 100-foot intervals as directed by the Engineer. The Contractor shall protect these hubs from displacement or

damage during construction. Any offset hubs damaged or displaced shall be reset by the Land Surveyor to the satisfaction of the Engineer.

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

SP-59 Monthly Schedules

The Contractor shall submit a monthly schedule to the City with each pay estimate. Pay estimates will not be processed unless accompanied by an updated monthly schedule.

SP-60 Contingency

The Contractor shall include a One Hundred Thousand Dollar (\$100,000.00) 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 (\$100,000.00) 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-64PS Bypass Pumping (Pumping Stations)

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.

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 dynamic head (T.D.H) as specified on the Plans.

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. 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. 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. 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. 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 (TEC) 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-65 Pump Characteristics

See Section 38 – Sewage Pumping Equipment.

SP-66 Data to be Submitted on Pumping Station

Within 10 days after the date upon which the Contractor is issued the Notice of Award and prior to his entering into any subcontract or placing any order for the manufacture of any equipment, the Contractor shall submit the following information, in triplicate, to the Engineer:

1. The names and addresses of the equipment manufacturers and the locations of the shops at which the equipment will be manufactured.
2. A general description of the equipment proposed.
3. Any additional information that the Engineer may deem necessary in order to determine the ability of the manufacturer to produce the equipment as called for by the Contract Documents.

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

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-70 Electrical Equipment Certification

All equipment and materials shall be UL listed or listed and labeled as complying with the requirements of a Southern Building Code Congress International, Inc. (SBCCI) recognized testing laboratory, for the particular application, whenever available.

An electrical/mechanical system that is not available as a standard UL listed assembly (e.g. industrial equipment of unique configuration or custom design) shall be composed of listed components, whenever they are available, and constructed in accordance with the design documents, and the latest nationally recognized industry standards. The Contractor shall certify in writing that the equipment satisfies the above requirements and that it has been installed in compliance with the latest edition of the National Electrical Code (NEC) and Chapter 5 of the City of Tampa Code. The certification shall be submitted to the City's Electrical Inspection Bureau, with a copy sent to the Sanitary Sewer Department's Resident Engineer, prior to final inspection. A sample certification document is attached to these Specific Provisions as a formatting guide.

The Contractor shall secure all required permits and arrange for progress and final inspections as the work develops.

SP-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 2017 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 2020 Florida Building Code, 7th 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 provided industrial power system installations shall be of similar complexity, content and scope of the contract bid project. Electrician shall supply the City with references of industrial clients that will attest to the Electrician's work experience and power system installations.

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 two (2) 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 draft 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 by the Engineer of the draft PDF submittal, the Contractor shall furnish to the Engineer the final PDF and two (2) 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, the 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 (1) high resolution color, bookmarked, and unsecured electronic portable document format (PDF) file for all Submittals, RFI, and Shop Drawings. The City will review the submittals and return 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 asbuilt 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-79 Water Service Line Replacement (Water Dept. now accepts Polyethylene Services)

Water service lines shall be replaced as shown on the drawings and shall be constructed per Tampa Water Department (T.W.D.) Specifications.

All copper service lines, including those having a meter box which will remain in a driveway undisturbed by construction, shall remain in service and be protected in place by the Contractor.

If the Contractor desires to temporarily disconnect the service line due to construction methodology, he must submit a written request to the Engineer at least three (3) working days prior to the proposed disconnect. If approved, the service line shall be removed from main to meter including curb stop. The Contractor shall provide twenty-four (24) hour written notice to the consumer prior to the service interruption.

Service lines falling within four (4) inches of the proposed base or subbase material shall be lowered in place. Couplings shall not be used to achieve sufficient depth. If the required depth cannot be achieved without the use of couplings, a new service line shall be installed by the Contractor from main to meter as specified herein. The Contractor shall be compensated for this work under the appropriate Contract Item.

SP-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 above ground piping and valves shall be painted black. 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)	(Assigned by the City)

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 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 Contract Items, or in the total Lump Sum price, and unless the area is within the pipeline pay limits, no separate payment will be made therefor.

SP-86 Temporary Stockpiling

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

Public Right-of-Way

- a. The Contractor will not be allowed to stockpile suitable, excavated material within right-

of-way for a period in excess of 30 calendar days. Unsuitable excavated material shall not be stockpiled within public right-of-way for a period in excess of 7 calendar days.

Location other than Public Right-of-way

b. The Contractor shall:

- 1) Obtain the permission (in writing) from the owner of the property where stockpiling is desired.
- 2) At his own expense present the above letter and a contour plan of the site to the Engineer for approval of the stockpiling site.

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

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

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

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

SP-89 Temporary Work Stoppages

The Contractor shall temporarily discontinue all construction activities from, and including, Thanksgiving Day through the following Sunday, and December 24 through January 2.

Prior to temporary work stoppages, all streets shall be restored to permit access to all businesses and residences and to allow ingress and egress by local traffic only. The Contractor shall maintain all streets at this condition level for the duration of the shutdown period.

All equipment, except that used for excavation, bypass pumping, and well pointing, and all materials including, but not limited to, manhole structures, pipe, and stockpiled material shall be removed to either the Contractor's storage lot or to a location outside the project area as approved by the Engineer.

The Contractor will also be required to accommodate the annual Gasparilla Parade and Gasparilla Run by ceasing construction activities and providing ingress and egress to allow local traffic only. The time limits for these requirements shall be from one day before to one day after the Gasparilla Parade and the Gasparilla Run. Accommodation of these events will entail restoration of all streets to at least a sand seal coat of crushed concrete or limerock base. All equipment, except that used for excavation and well pointing, and all materials including, but not limited to, manhole structures, pipe, and stockpiled material shall be removed to either the Contractor's storage lot or to a location outside the project area as approved by the Engineer.

All costs associated with furnishing labor, equipment, temporary pavement restoration, demobilization, mobilization, signage, barricades, clean-up, security, and any other incidentals required to accommodate the Thanksgiving, Christmas and New Years' Holidays and Gasparilla Parade and Race shall be included in the various Contract Unit Prices, or in the Lump Sum, as applicable, and no additional payment shall 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-98 Valves

Valves shall be handled with care to avoid damage. All valves shall be loaded and unloaded by lifting, and under no circumstances shall valves be dropped, skidded, or rolled. Valves shall not be placed, under any circumstances, against pipe or other fittings in such a manner that damage could result. Slings, hooks or tongs used for lifting shall be padded in such a manner as to prevent damage. If any part of the valves' coating and lining is damaged by the Contractor, the repair and replacement shall be made by the Contractor at his expense in manner satisfactory to the Engineer before installing. Valves shall also be stored at all times in a safe manner to prevent damage and kept free of dirt, mud or other foreign matter. All valve gaskets shall be stored and placed in a cool location out of direct sunlight and out of contact with petroleum products. All gaskets shall be used on a first-in, first-out basis.

Gate valves, plug valves, and butterfly valves shall be set and joined to new pipe in a manner heretofore specified for cleaning, laying and joining pipe. Valves shall be installed such that the operating nut is plumb.

Cast iron valve boxes shall be firmly supported and maintained centered and plumb over the operating nut of the valve by the Contractor with box cover flush with the surface of the finished pavement or at such other levels as may be directed. Valve boxes shall have 6-inch thick wire mesh reinforced concrete pads poured around the top section of the valve box when in pavement or when directed by the Department. The pad shall be 24 inches square and shall be centered on the valve box. All Department valve covers shall be painted safety blue as prescribed by the American Public Works Association (APWA) uniform color code for utility systems.

The valve and valve box shall be installed so City personnel can insert a valve key through the valve box and completely open and close the valve. This test will be accomplished before final acceptance of the valve and box.

The work shall include all labor, materials, equipment, tools and any incidentals required for the completion of the work.

Payment for valves shall be included in the price of the work to which the valves are incidental.

SP-104 Castings Identification

All casting covers, such as for inlets and manholes, shall bear the appropriate City of Tampa identification for storm sewers and for sanitary sewers, as shown on the Plans and directed by the Engineer.

SP-127 Sanitary Sewer Manhole Adjustment

The Contractor shall adjust all sanitary sewer manholes, as shown on the Plans and directed by the Engineer, to match the proposed new roadway profile.

All costs associated with manhole adjustment shall be included in the Lump Sum and no separate payment shall be made therefor.

SP-129 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 unsecured color PDF copy set of "As-Built" plans along with the supporting survey data and CAD files. The survey shall be signed and sealed by a licensed Land Surveyor registered with the Florida Department Board of Professional Surveyors and Mappers. 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 and their location identified by station, offset and elevation, when performed by the Contractor.

As-builts shall clearly show installed horizontal and vertical location of all bends & fittings, valves, solid sleeves, hot tap sleeves & valves, lines stop tees permanently capped and left in active pipe, air release valve tap & valve boxes, tees, wyes, horizontal & vertical points of inflection, limits of removed pipes, limits of grouted pipes and limits of concrete encasements. Elevation deviations from the plans shall also be noted. The Contractor shall provide the City with the Surveyor's electronic CAD file of the as-built locations.

Where applicable, As-builts shall conform to the "Record Drawing Requirements" section found in the City of Tampa Wastewater Department Technical Standards Guidelines for Construction of Wastewater Facilities (latest version). A copy of this standard can be found online on the City's Wastewater website.

All relocation of structures and pipelines must be clearly shown on Plans with as-built stations and offsets verified. All as-built inverts for the entire project must be clearly noted on plan sheets. No separate payment shall be made for this work.

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 unsafe conditions to the attention of any member of the Contractors work force does not relieve the Contractor of this responsibility.

All Contractor employees and sub-contractors shall 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 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 "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.

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 no separate payment shall be made thereof.

SP-137 Post-installation Testing of PVC Pipe

In accordance with the provisions of Workmanship and Materials Section 11 – PVC Pipe Gravity, subsection W-11.07, all PVC pipelines shall be leakage tested, deflection tested, and T.V. inspected prior to final acceptance of the project. The Contractor shall be responsible for performing all tests and inspections on the pipeline.

All costs associated with pipeline testing and T.V. inspection shall be included in the Lump Sum, and no separate payment will be made therefor.

* * *



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

(Modifying This Form or Failure to Complete and Sign May Result in Non-Compliance)

Certification: I hereby certify that the above information is a true and accurate account of payments to 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 may 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.

Sign Information

Transforming Tampa's Tomorrow



This project will help transform Tampa into a more resilient and sustainable city.

Font

Proxima Nova font family

If that font is not available, the

Calibri font family may be used

Colors

PANTONE 285 C

PANTONE 376 C

PANTONE 382 C

The QR code should be 5.25" wide by 5.25"

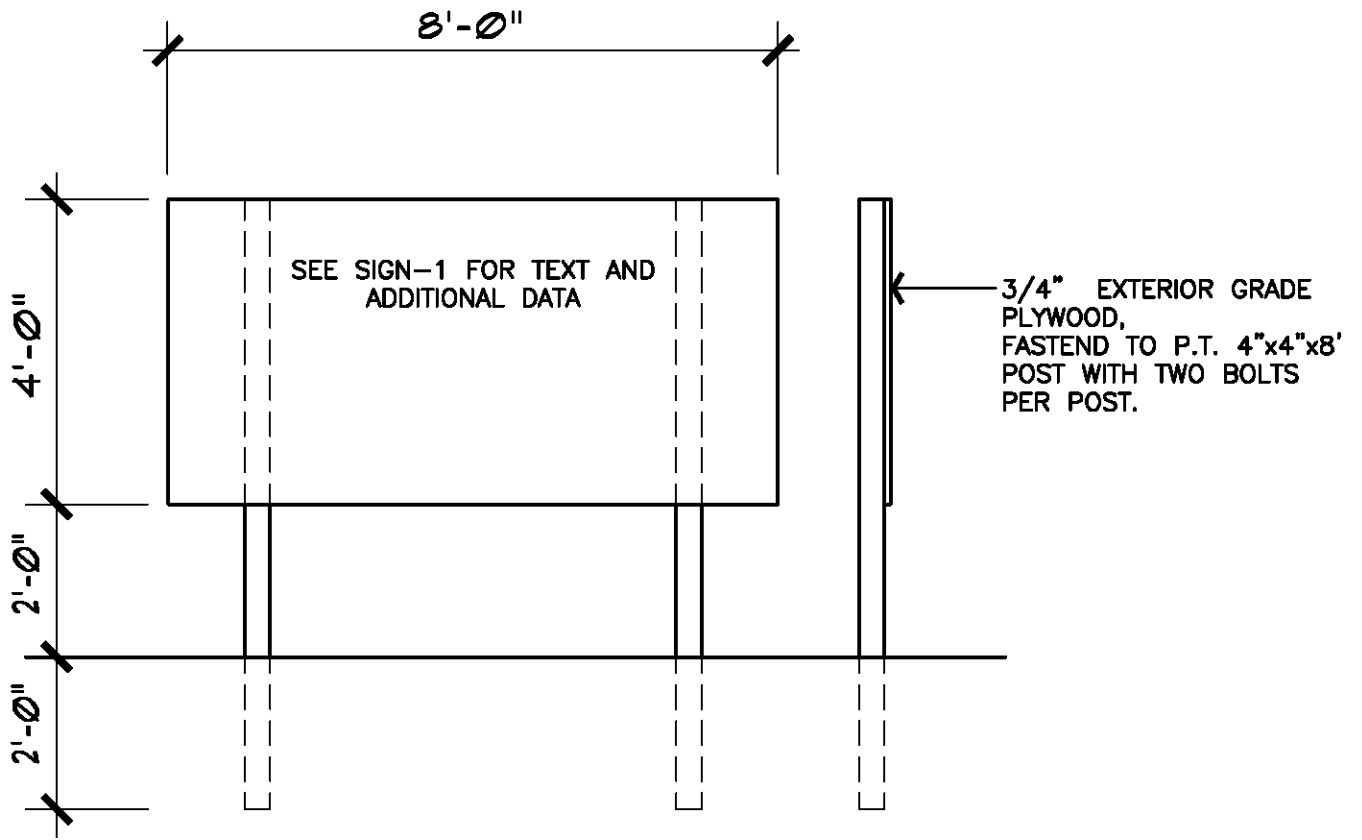
Sign should be 48" high by 96" wide

12"

12"

scale:

SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR



SECTION 1 - EXCAVATION - EARTH AND ROCK

W-1.01 General

Opencut excavations shall be made to the widths and depths necessary for constructing all structures, pipelines and other conduits included in the Contract, according to the Plans, and includes the excavation of any material which, in the opinion of the Engineer, is desirable to be excavated for any purpose pertinent to the construction of the work. Banks more than 5 feet high, where a danger of slides or cave-ins exist, shall be shored or sloped to the angle of repose.

Where excavations are to be made below groundwater, the Contractor shall submit to the Engineer for approval, in detail, his proposed method for control of groundwater, including a description of the equipment he plans to use and the arrangement of such equipment. No such excavation shall be started until approval of the Engineer has been obtained. Dewatering work shall be included in the Lump Sum and no separate payment will be made therefor.

W-1.02 Clearing

The site of all opencut excavations shall first be cleared of obstructions preparatory to excavation. This includes the removal and disposal of vegetation, trees, stumps, roots and bushes, except as specified under the subsection headed "Trench Excavation."

W-1.03 Authorized Additional Excavation

In case the materials encountered at the elevations shown are not suitable, or in case it is found desirable or necessary to go to an additional depth, or to an additional depth and width, the excavation shall be carried to such additional depth and width as the Engineer may direct in writing. The Contractor shall refill such excavated space with either Class 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 as extra work.

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 therefor.

W-1.05 Segregation and Disposal of Material

Topsoil suitable for final grading and landscaping and excavated material suitable for backfilling or embankments shall be stockpiled separately on the site in locations approved by the

Engineer. Excavated and other material shall not be stored nearer than 4 feet from the edge of any excavation and shall be so stored and retained as to prevent its falling or sliding back into the excavation. Surplus excavated material and excavated material unsuitable for backfilling or embankments shall become the property of the Contractor and shall be transported, as approved by the Engineer, away from the site of the work to the Contractor's own place of disposal.

W-1.06 Shoring and Sheeting

All excavations shall be properly shored, sheeted, and braced or cut back at the proper slope to furnish safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, and to avoid delay to the work, all in compliance with the U. S. Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). The minimum shoring, sheeting and bracing for trench excavations shall meet the general trenching requirements of the safety and health regulations. Before starting excavation for jacking pits and structures, the Contractor shall submit complete design calculations and working drawings of proposed sheeting and bracing arrangements which have been prepared, signed and sealed by a Professional Engineer registered in the State of Florida. Bracing shall be so arranged as not to place any strain on portions of completed work until the general construction has proceeded far enough, in the opinion of the Engineer, to provide ample strength. If the Engineer is of the opinion that at any point the sheeting or supports furnished are inadequate or unsuited for the purpose, he may order additional sheeting or supports to be installed. Whether or not such orders are issued, the sole responsibility for the design, methods of installation, and adequacy of the sheeting and supports shall be and shall remain that of the Contractor.

Tight sheeting shall be used in that portion of the excavation in City collector and arterial streets and in State and County highways below the intersection of a 1 on 1 slope line from the edge of the existing pavement to the nearest face of the excavation.

In general, sheeting for pipelines shall not be driven below the elevation of the top of the pipe. If it is necessary to drive the sheeting below that elevation in order to obtain a dry trench or satisfactory working conditions, the sheeting shall be cut off at the top of the pipe and left in place below the top of the pipe at no additional cost.

The sheeting and bracing shall be removed as the excavation is refilled in such a manner as to avoid the caving in of the bank or disturbance to adjacent areas or structures except as otherwise shown or directed. Voids left by the withdrawal of the sheeting shall be carefully filled by ramming or otherwise as directed.

Permission of the Engineer shall be obtained before the removal of any shoring, sheeting, or bracing. Such permission by the Engineer shall not relieve the Contractor from the responsibility for injury or to other property or persons from failure to leave such sheeting and bracing in place.

W-1.07 Sheeting Left in Place

The Engineer may order, in writing, any or all sheeting or bracing to be left in place for the purpose of preventing injury to the structures or to other property or to persons, whether such sheeting

or bracing was shown on the Plans or placed at his direction or otherwise. If left in place, such sheeting shall be cut off at the elevation ordered, but, in general, such cutoffs shall be at least 18 inches below the final ground surface. Bracing remaining in place shall be driven up tight.

The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders.

Sheeting and bracing left in place, by written order of the Engineer, will be paid for by provisions of extra work.

W-1.08 Removal of Water

At all times during the excavation period and until completion and acceptance of the work at final inspection, ample means and equipment shall be provided with which to remove promptly and dispose of properly all water entering any excavation or other parts of the work. The excavation shall be kept dry. No water shall be allowed to rise over or come in contact with masonry and concrete until the concrete and mortar have attained a set satisfactory to the Engineer and, in any event, not sooner than 12 hours after placing the masonry or concrete. Water pumped or drained from the work hereunder shall be disposed of in a safe and suitable manner without damage to adjacent property or streets or to other work under construction. Water shall not be discharged onto streets without adequate protection of the surface at the point of discharge. No water shall be discharged into sanitary sewers. No water containing settleable solids shall be discharged into storm sewers. Any and all damage caused by dewatering the work shall be promptly repaired by the Contractor.

W-1.09 Structure Excavation

Excavations shall be of sufficient size and only of sufficient size to permit the work to be economically and properly constructed in the manner and of the size specified. The bottom of the excavation in earth and rock shall have the shape and dimensions of the underside of the structure wherever the nature of the ground will permit.

W-1.10 Trench Excavation

Before starting trench excavation, all obstructions which are to be removed or relocated shall be cleared away. Trees, shrubs, poles, and other structures which are to be preserved shall be properly braced and protected. All trees and large shrubs shall be preserved with damage to the root structure held to a minimum, unless otherwise shown or specified. Small shrubs may be preserved or replaced with equivalent specimens.

The width of trenches shall be such as to provide adequate space for workmen to place, joint, and backfill the pipe properly, but shall be kept to a minimum. Unless otherwise approved by the Engineer, the clear width of the trench at the level of the top of the pipe shall not exceed the sum of the outside diameter of the pipe barrel plus 24 inches.

In sheeted trenches, the clear width of the trench at the level of the top of the pipe shall be measured to the inside of the sheeting.

Should the Contractor exceed the maximum trench widths specified above, without written approval of the Engineer, he may be required to provide, at his own expense, concrete cradle or

encasement for the pipe as directed by the Engineer, and no separate payment will be made therefor.

The Contractor shall excavate trenches to the respective depths, below the bottom of the pipe, for the various classes of pipe bedding shown on the Plans so that pipe bedding material can be placed in the bottom of the trench and shaped to provide a continuous, firm bearing for the pipe barrel and bells.

If unstable material is exposed at the level of the bottom of the trench excavation, it shall be excavated in accordance with the subsection headed "Authorized Additional Excavation." When in the judgement of the Engineer the unstable material extends to an excessive depth, he may advise the Contractor in writing to stabilize the trench bottom with a crushed stone, sand mat or gravel mat to ensure firm support for the pipe by other suitable methods. Payment for such trench stabilization will be made under the appropriate Contract Items or where no such items exist, as extra work as specified in Section 7 of the Agreement.

The open excavated trench preceding the pipe laying operation and the unfilled trench with pipe in place shall be kept to a minimum length causing the least disturbance to traffic and use of adjacent property. Ladders shall be provided and so located as to provide means of exit from the trench without more than 25 feet of lateral travel.

W-1.11 Rock Excavation

The term "rock" as used herein shall include all materials which have compressive strengths in excess of 300 psi in their natural undisturbed state and which, in the opinion of the Engineer, require drilling and blasting, wedging, sledging, barring or breaking with power tools not otherwise required for normal excavating.

Rock shall be excavated, within the boundary lines and grades as shown on the Plans, specified, or given by the Engineer. Rock removed from the excavation shall become the property of the Contractor and shall be removed by him away from the site of the work to his own place of disposal, and no separate payment will be made therefor.

All shattered rock and loose pieces shall be removed.

For trench excavation in which pipelines or other conduits are to be placed, the rock shall be excavated to a minimum depth of 6 inches below the bottom of the pipe and the excavated space refilled with pipe bedding material. Placing, compacting, and shaping pipe bedding material shall be included in the Lump Sum contract price.

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 Lump Sum contract price.

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 made therefor.

Where applicable, the requirements of the subsections on "Trench Excavation" and "Structure Excavation" shall be followed.

Blasting may be performed only when approved by the Engineer and authorized by the Agency having jurisdiction over the subject location and in accordance with all laws, ordinances, and regulations of the Agency.

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."

* * *

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 wrapped in fabric and 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 dry density as determined by AASHTO Des: T-180. No large stone fragments shall be placed in the pipe bedding nor closer than two feet to any point on any pipe.

W-2.08 Bedding Placement for Precast Concrete Manholes

No. 57 stone used for bedding beneath precast manhole bases shall be placed in uniform layers not greater than 6 inches in loose thickness and thoroughly compacted in place with suitable mechanical or pneumatic tools.

W-2.09 Structure Backfill

Backfill around manholes, risers, and structures shall be suitable job excavated material, selected fill material, or other material approved by the Engineer. Such backfill shall extend from the bottom of the excavation or top of structure bedding to the bottom of pavement base course, subgrade for lawn replacement, the top of the existing ground surface, or to such other grades as may be shown or given by the Engineer.

The backfill shall be placed in uniform layers not greater than 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 City with the assistance of the Contractor. Testing for projects located at the Howard F. Curren Treatment Plant or projects related to pumping station rehabilitations shall be tested by an approved third party lab at the expense of the Contractor.

* * *

SECTION 4 – CONCRETE AND CONCRETE MATERIALS

W-4.01 General

This section covers concrete materials and performance requirements for wastewater structures. Section 345 – Portland Cement Concrete is to be used for all structural concrete and concrete flowable fill.

W-4.02 Cement

Cement shall be from a source approved by the Engineer before the cement is ordered. Domestic manufacturers of cement shall furnish to the Engineer notarized Certificates of Manufacture as evidence that the cement conforms to the requirements of the Specifications. These certificates shall include mill test reports on the cement. Suppliers of foreign cements shall furnish to the Engineer test data from a testing laboratory approved by the Engineer to show conformance with all applicable requirements of ASTM Des: C 150. Samples for testing shall be taken in accordance with ASTM Des: C 183. The cost of tests on foreign cement shall be considered as part of the cost of the work and shall be included under the appropriate Contract items. No separate payment for such testing will be made. Cement shall be either air-entraining portland cement or standard portland cement, except as otherwise specified. If standard portland cement is used, an air-entraining agent meeting the requirements of ASTM Des: C 260 shall be added to the concrete at the time of mixing in an amount sufficient to produce from 4 to 6 percent entrained air in the concrete for plastic mixes having a slump of 2 to 4 inches. Standard portland cement shall meet the requirements of ASTM Des: C 150, Type I or Type II, and air-entraining cement shall meet the requirements of ASTM Des: C 150, Type IA or Type IIA.

W-4.03 High-Early Strength Cement

In case high-early strength cement is used in any special part of the work, it shall be true portland cement with no chemicals or other substances added to expedite hardening and shall be of a brand approved by the Engineer. The cement shall meet the requirements of ASTM Des: C 150 Type III or Type IIIa. High-early strength cement shall be used only with the approval of the Engineer.

W-4.04 Fine Aggregate

Fine aggregate shall be natural sand, washed clean, having hard, strong, sharp, durable, uncoated grains; and shall be free from injurious amounts of dust, lumps, soft or flaky particles, mica, shale, alkali, organic matter, loam, or other deleterious substances. Fine aggregate shall conform to the requirements of Section 902 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

W-4.05 Coarse Aggregate

Coarse aggregate shall consist of gravel or broken stone composed of strong, hard, durable, uncoated pebbles or rock fragments, washed clean and free from injurious amounts of shale, coal, clay, lumps, soft fragments, dirt, glass, and organic and other deleterious substances. It shall conform to ASTM Des: C 33. The size shall be No. 57, as specified in Table II of ASTM Des: C 33.

W-4.06 Admixtures

The use of admixtures will be permitted but must be approved by the Engineer. Set retarders shall be Pozzolith 100-XR as manufactured by BASF, Cleveland, Ohio, or Plastiment as made by Sika Chemical Corporation, Lakewood, OH, or equal. Retarding admixtures shall be used in strict accordance with the manufacturer's directions and the manufacturer shall make available, at no cost upon 72 hours notification, the services of a qualified full time field representative to assure proper use of the admixture.

Set retarding admixtures shall be used only with the approval of the Engineer. The amount of set retarder added shall be sufficient to keep the concrete workable during the period of placement and finishing.

W-4.07 Water

Water used in mixing concrete shall be clean and shall not contain deleterious amounts of acids, alkalies, or organic materials. All water shall be furnished from sources approved by the Engineer.

W-4.08 Fly Ash

Fly ash shall be a local product with cementitious properties, conforming to the requirements of ASTM 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, and shall be from a source approved by the Engineer.

Fly ash shall be stored at the concrete mixing plant separate from the cement, in accordance with the requirements specified for storage of cement. Cement and fly ash shall not be intermixed prior to being added to the concrete mix.

W-4.09 Concrete Strength Classes

Concrete shall be divided into two grades, classified according to compressive strength, to be used in the respective places shown on the Plans, called for in the Specifications, or ordered by the Engineer. The classes of concrete mixtures are referred to as Class B, and Class D.

Class B concrete is intended principally for reinforced concrete structures, and shall be used for columns, walls, beams, slabs, equipment pads, precast structures and the like.

Class D concrete is intended principally for low strength concrete, plain or reinforced, used for soil stabilization, filling, and other similar purposes. For large volume, boulders or fragments of rock excavated during construction may be embedded in the concrete to provide added bulk. Care shall be taken in placing the boulders or rock fragments, so that there are no voids in the concrete.

W-4.10 Strength and Proportion

Concrete mixes shall be designed and proportioned to provide the following minimum compressive strengths and the proper workability without exceeding the stipulated maximum quantities of mixing water:

Class	Compressive Strength - psi		<u>Maximum Water</u> Gallons Per Sack
	7-day Test	28-day Test	
B	2,700	4,000	5-1/2
D	1,300	2,000	7-1/4

Concrete, except Class D, shall contain not less than 564 pounds (six standard 94-pound bags) of cement per cubic yard.

W-4.11 Moisture Content of Aggregates

The quantity of free water contained in the aggregate shall be determined from time to time as required by the Engineer, and this quantity shall be deducted from the water added at the mixer, but no change shall be made in the water-cement ratio.

The quantity of water used in each batch shall be the total quantity, including the free moisture contained in the aggregate.

W-4.12 Consistency

Proportions of ingredients shall be varied to secure the desired concrete consistencies when tested in accordance with ASTM Des: C 143, conforming to the following slump requirements:

Concrete Placement	Minimum and Maximum Slump in Inches	
	Class B	Class D
Normal	3 to 4	3 to 5
Pumped	4 to 6	4 to 6

In all cases, the proportions of aggregates for concrete shall be such as to produce mixtures which will work readily into the corners and angles of the forms and around reinforcement, without permitting the segregation of materials or the collection of free water on the surface. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve shall not be less than 30 percent, nor greater than 45 percent of the total,

unless otherwise required by the Engineer.

W-4.13 Field Tests

During the progress of the work, a reasonable number of test cylinders shall be made, cured, and stored in accordance with ASTM Des: C 31 and shall be tested in accordance with ASTM Des: C 39. Each test shall consist of three cylinders, one laboratory control cylinder to be tested at 7 days, and one field control cylinder to be tested at 28 days. If the 7-day cylinder is not satisfactory, the third cylinder, a laboratory control cylinder, will be tested at 7 days. Otherwise, the third cylinder will be tested at 28 days.

The Contractor shall furnish all labor, equipment and materials necessary for making concrete test cylinders. Concrete test cylinders must be tested by a materials testing laboratory approved by the Engineer. The Contractor is responsible for all costs associated with testing.

The average strength of all the cylinders shall be equal to or greater than the strengths specified, and at least 90 percent of all the tests shall indicate a strength equal to or greater than the strength specified. In cases where the strength of the test cylinders for any portion of the structure falls below the requirements specified herein, the Engineer may order a change in the mix or water content for the remaining portion of the work, and may require the Contractor to secure test specimens of the hardened concrete represented by these cylinders. The number of test specimens required to be taken shall be the same as the number of test cylinders made for each concrete placement. Specimens shall be secured and tested in accordance with ASTM Des: C 42. If the specimen tests further substantiate that the concrete represented by the cylinders and specimens is below the strength requirements specified herein, the Engineer may order such concrete removed and rebuilt at the expense of the Contractor.

W-4.14 Ready-Mixed Concrete

Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in ASTM Des: C 94, and subject to all provisions herein relative to materials, strength, proportioning, consistency, measurement, and mixing.

The rate of delivery of the mixed concrete shall be such that the interval between placing of successive batches shall not exceed 45 minutes. The elapsed time between the introduction of mixing water to the cement and aggregates and depositing concrete in the work shall not exceed 45 minutes including mixing and agitating time.

W-4.15 Forms - General

Forms shall conform to shape, lines, and dimensions of the member as shown on the Plans. They shall be substantial, properly braced, and tied together so as to maintain position and shape and to resist all pressures to which they may be subjected. Forms shall be sufficiently tight to prevent leakage of mortar. The size and spacing of studs and walers shall be determined by the nature of the work and the height to which concrete is placed. In all cases, walers shall be doubled, and the size of studs and walers used shall not be less than 2 by 6 inches. Joints shall be snug and shall occur at the designated locations only. Horizontal joints shall be level and vertical joints plumb.

The entire inside surfaces of forms shall be oiled with an approved form oil or shall be

thoroughly wetted just prior to placing concrete.

The Contractor shall be responsible for the adequacy of all forms and for remedying any defects resulting from their use, notwithstanding inspection and prior approval by the Engineer.

W-4.16 Placing Concrete

Concrete shall be placed only in forms which have been approved by the Engineer and in his presence. Where the procedure is not specifically described herein, the placing of concrete shall be in accordance with the recommendations of ACI Standard 614.

After mixing, concrete shall be transported rapidly to the place of deposit. Concreting operations shall be continuous until the section, panel, or scheduled placement is completed.

Concrete may be conveyed in buckets, buggies, chutes, or other approved means. Apparatus used for conveying concrete shall be flushed thoroughly with water before and after each run. The point of delivery of concrete shall be as close to the work as possible and in no case more than 5 feet from the point of final deposit in the horizontal direction. Rehandling of concrete will not be permitted.

Concrete shall be deposited level in layers not to exceed 18 inches in a manner to prevent segregation of the ingredients.

Wall concrete shall be deposited through heavy duck canvas or galvanized iron chutes equipped with suitable hopper heads. Chutes shall be of variable lengths, so that the free fall of concrete shall not exceed 3 feet.

Freshly laid exposed concrete shall be protected in an approved manner against damage from the elements and unavoidable construction operations.

Special care shall be taken to place the concrete against the forms, particularly in angles and corners, in order to prevent voids, pockets, and rough areas. The concrete shall be rodded and spaded in a manner to work the coarse aggregate away from the forms, whether vibrators are used or not. Every precaution shall be taken to make all concrete masonry solid, compact, watertight, and smooth.

W-4.17 Cold Weather Requirements

When the atmospheric temperature at the work is 40 degrees F or below, or when the U.S. Weather Bureau forecasts such temperatures within 24 hours, the freshly placed concrete shall be protected against freezing.

W-4.19 Hot Weather Requirements

For placement of concrete in hot weather, the recommendations of ACI Standard 305R shall be followed.

W-4.19 Curing

Standard portland cement concrete surfaces normally exposed to the atmosphere shall be

protected against excessively rapid drying by curing a minimum period of seven days. When average daily temperatures are above 70 degrees F, similarly exposed high-early strength concrete surfaces shall be cured for a minimum period of three days. When daily average temperatures are below 70 degrees F, the curing period for all concrete shall be extended as directed by the Engineer. The curing period shall commence immediately following the placing of the concrete. Curing shall be accomplished by a method approved by the Engineer. Should there be any delay in the application of the method of curing used, the concrete shall be covered with moistened burlap or kept wet by sprinkling.

W-4.20 Grout and Mortar

Grout for grouting around tunnel linings and for other locations as specified or directed shall be mixed in the proportions of one (1) part portland cement to one (1) part of sand by volume.

Non-shrink grout shall be a pre-blended mixture of a non-shrinking agent and shall be Embecco 636 as manufactured by the Master Builders Company, Cleveland, Ohio, or Propak as manufactured by Protex Industries, Denver, Colorado, or equal.

Lean grout for backfilling the space surrounding the sewer sections in tunnels or other areas as specified or directed shall be mixed in the proportion of one (1) part portland cement to twelve (12) parts of sand, by volume.

Mortar for brick or concrete block masonry shall be composed of one (1) part Type IIA portland cement to one (1) part of sand, by volume. Sufficient water shall be added to give the proper consistency. The mixture shall be thoroughly worked to produce a uniform mortar with all particles of aggregate well coated.

W-4.21 Water Stops

See Section W-7.02.

* * *

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 Des: 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:
 - (1) #6 bars or larger - 2 inches
 - (2) #5 bars or smaller - 1-1/2 inches

2. Slabs (See Item 6)

- a. Troweled surfaces - 1-1/2 inches
- b. Elsewhere - 1 inch

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 - 2-1/2 inches
- b. Sides and ends - 3 inches
- c. Bottom, Concrete deposited directly against ground - 3 inches

- Concrete deposited directly against lean concrete work mat - 2 inches

6. Add 1/2 inch for surfaces contacting or exposed to water or sewage.

7. Laps - as specified in "Table 1 - Grade 60 Reinforcing Bar Splice Lapping Lengths" in the subsection headed "General."

8. Spacing - clear distance between parallel bars - 2 inches minimum.

* * *

SECTION 7 - CONSTRUCTION AND EXPANSION JOINTS FOR CONCRETE

W-7.01 General

Construction and expansion joints shall be placed at all locations shown. No additions, deletions, or changes in location of construction and expansion joints shall be made without the written approval of the Engineer. Construction joints shall include a formed key and shall include a water stop where shown. Expansion joints shall include a joint filler between concrete faces, and shall include a water stop, and sealant with back-up rod where shown.

Water stops in the walls shall be carried into lower slabs and shall join the water stops in the slabs. All water stops shall be continuous. Water stops shall be set accurately to the position and line shown. Edges shall be held and securely fixed in position at intervals of not more than 24 inches so that they will not move during the placing of the concrete. No nails shall be driven through the water stops.

The Contractor shall submit samples and specifications of the materials he proposes to use.

All materials shall be installed or applied in accordance with the manufacturer's recommendations, unless otherwise specified herein.

W-7.02 Water Stops

Water stops shall be made of extruded polyvinyl chloride. No reclaimed plastic material shall be used in the manufacture of the water stops. Plastic water stops shall meet the requirements of the Corps of Engineer Specification CRD-C572, except as modified herein. The Shore A/10 durometer hardness shall be between 73 and 79, the tensile strength not less than 1,850 psi, and the specific gravity not more than 1.38.

Unless otherwise shown, water stops for construction joints shall be flat, at least 6 inches wide, and not less than 3/8 inch thick at the thinnest section. The water stop shall have ribbed longitudinal strips.

Unless otherwise shown, water stops for expansion joints shall be at least 9 inches wide and not less than 1/4 inch thick at the narrowest point and not less than 3/8 inch thick immediately adjacent to the center of the water stop. The water stop shall have ribbed longitudinal strips with a 3/4-inch inside diameter hollow bulb center. The water stop shall permit a joint movement of 1/4 inch under a tensile force of not more than 500 pounds per lineal inch.

Corners and intersections for all water stops shall be prefabricated so that only butt joints need be made in the field. Field fabrication of corners and intersections requires approval of the Engineer. Corners and intersections shall be mitered and assembled with approved equipment, as described for field joints.

Field joints shall be made by cutting the ends of the sections to be spliced so they will form a smooth even butt joint. The cut ends shall be heated with the splicing tool until the plastic melts. The two ends shall be pressed together until the plastic cools. Splicing shall cause as little damage to the continuity of the ribbed strips as possible.

W-7.03 Joint Filler for Expansion Joints

Joint filler shall be used for all expansion joints. Joint filler shall be closed cell polyethylene Sonoflex F Foam as manufactured by Sonneborn Building Products, or PVC joint filler No. 327, by A. C. Horn, or equal, of the thickness shown.

Joint filler shall be placed against the completed portion of the work before the concrete for the next section is placed. The filler shall be fastened to the hardened concrete with a compatible adhesive in accordance with manufacturer's instructions. The filler shall extend through the thickness of the wall or slab and shall be flush with the finished surface, except where a joint sealant is shown. In joints having a water stop, the filler shall be fitted accurately on each side of the water stop to prevent the intrusion of concrete.

W-7.04 Joint Sealant

Expansion joints shall be finished with a joint sealant where shown or specified.

Joint sealant materials may be either a single component urethane compound meeting the requirements of Fed. Spec. TT-S-00230C, or a two-component urethane compound meeting the requirements of Fed. Spec. TT-S-00227E, except as modified herein.

The urethane sealant shall be 100 percent polymer, nonextended, containing no solvent, lime, or coal tar. Color shall be as selected by the Engineer, but shall not be black. Sealant properties shall conform to the following table:

<u>Property</u>	<u>Value</u>	<u>Test Method</u>
Maximum final cure (days)	3	
Tensile strength (psi)	250-400	ASTM D 412
Minimum elongation (%)	400	ASTM D 412
Modulus at 100% elongation (psi)	40-60	Fed. Spec.
Shore A hardness	30-40	Shore Durometer
Solid content (%)	98-100	
Peel strength (lb/in.)	50-60	Fed. Spec.
Minimum recovery (%)	75-85	Fed. Spec.
Initial tack-free cure (hrs.)	24-48	Fed. Spec.

The two-component sealant shall be mixed using a slotted paddle and slow speed mixer for 5 to 8 minutes, continually working paddle from top to bottom until sealant color is uniform. The side of the container and paddle blade shall be scraped down several times during the mixing operation to ensure uniform mixing.

Joint surfaces shall be properly prepared by removing all foreign matter and concrete laitance so that concrete surfaces are structurally sound, clean, dry, and free of all oil, grease, wax,

waterproofing compounds, or form release materials prior to the application of primer and sealant. All concrete joint surfaces and all surfaces exposed to water shall be primed prior to sealing, with no exceptions. Priming of other surfaces shall be as recommended by the manufacturer of the sealant. The primer shall be as recommended by the manufacturer of the sealant, subject to the approval of the Engineer. Primer shall be applied by either brushing or spraying on the joint surfaces. Sealant shall be installed within 2 to 24 hours after the application of primer.

For horizontal joints, sealant may be installed by pouring directly from a suitable shaped can or by flowing from a bulk-loading gun. Vertical joints shall be filled from a gun, starting from the bottom, to avoid bridging and the formation of air voids. Overhead joints shall be filled from a gun, by laying a bead along each side of the joint and then filling the middle. Immediately after installation, sealant shall be tooled in order to establish firm contact with joint surfaces and to provide a smooth sealant surface. Method of tooling shall be in accordance with manufacturer's instructions.

Joint depth shall be controlled with the use of joint fillers and backup materials. Fillers and backup materials in contact with sealant shall be nonimpregnated and free from asphalt, creosote, oil, or extractable plasticizers. Backup material shall be closed cell polyethylene foam rod, such as Sealtight Backer Rod, Sonofoam Backer Rod, or equal, with a diameter 1/4 inch larger than the joint width. Joint widths and sealant depths shall be as shown, except that sealant depth shall not exceed 1/2 inch.

W-7.05 Unbonded Horizontal Joints

Unbonded horizontal joints shall be used as shown or required where slabs or beams must be prevented from bonding to footings, walls, columns, or other rigid parts of the structure.

Bonding shall be prevented by use of structural grade neoprene pads meeting the requirements of Section 25, Division 2 of the AASHTO Standard Specifications for Highway Bridges. The pads shall be placed over the bearing surface of the footing, wall, or other supporting part of the structure so as to isolate it from the new concrete being placed. The neoprene pads shall not be thinner than 1/4 inch.

* * *

SECTION 8 - METAL CASTINGS

W-8.01 General

Metal castings include all miscellaneous ferrous and nonferrous castings.

Wheel guards, valve boxes, manhole frames and covers, stop log grooves, brackets and supports for piping, gutter inlets, floor, roof and gallery drains, stormwater inlets, beehive grates and frames, cleanout covers, and special malleable iron castings and inserts are included in this classification.

W-8.02 Materials

Metal castings shall meet the requirements of the following standards, except as otherwise specified herein.

Gray Iron	ASTM Des: A 48
Malleable Iron	ASTM Des: A 47
Carbon Steel	ASTM Des: A 27
Alloy Steel	ASTM Des: A 148
Aluminum	ASTM Des: B 26
Aluminum Bronze	ASTM Des: B 148
Silicon Bronze	Navy Spec. 46B28
Manganese Bronze	ASTM Des: B 132 or B 147
Ductile Iron	ASTM Des: A 536

W-8.03 Workmanship

Castings shall be made accurately to approved dimensions and shall be planed or ground where marked or where otherwise necessary to secure perfectly flat and true surfaces. Allowance shall be made in the patterns so that the specified thickness shall not be reduced. Manhole and cleanout frames and covers shall conform to the details shown on the Plans and shall be true and shall seat at all points. No plugging of defective castings will be permitted. All castings shall be erected to accurate grades and alignment, and when placed in concrete, they shall be carefully supported to prevent movement during concreting.

W-8.04 Weights

No castings weighing less than 95 percent of the theoretical weight, based on required dimensions, will be accepted. The Contractor shall provide facilities for weighing castings in the presence of the Engineer, or shall furnish invoices showing true weights, certified by the supplier.

* * *

SECTION 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-9.09 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 10 - DUCTILE IRON PIPE AND FITTINGS

W-10.01 General

All ductile iron pipe shall meet the requirements of AWWA C151. The type and configuration of pipe bedding for buried pipe shall be as shown on the Plans. Coatings and linings for ductile iron pipe and fittings shall conform to the subsection headed "Coatings and Linings," contained herein. Pipe joints shall be bell and spigot, flanged, or mechanical joint as shown on the Plans.

Ductile iron pipe and ductile iron fittings buried in the ground for force mains or installed in pumping stations shall have a minimum thickness of Class 53 unless specified otherwise as shown on the Plans. Ductile push-on iron pipe and fittings for gravity systems, including house laterals, shall be Class 54 and shall have an interior lining as specified in the subsection "Lining for Ductile Iron Gravity Pipe."

W-10.02 Flanged Pipe

Flanged pipe shall conform to the requirements of AWWA C115. Flanges shall be ductile iron and shall have long hubs. There shall be no leakage through the pipe threads, and the flanges shall be designed to prevent corrosion of the threads from outside.

W-10.03 Fittings

All ductile iron fittings shall meet the requirements of AWWA C110 or AWWA C153 and have a minimum thickness of Class 53 or as specified, whichever is larger.

W-10.04 Flanged Joints

Flanged joints shall meet the requirements of ANSI Specification B16.1. Flanges, flange facing drilling, and protecting shall be as specified for flanged pipe. Bolts and nuts for flanged joints shall be Type 316 stainless steel unless otherwise stated on the Plans or directed by the Engineer.

Except where otherwise directed by the Engineer, gaskets for flanged joints shall be of the full-face type, meeting the requirements of ANSI B16.21. Gaskets shall be Nitrile rubber, also known as Buna-N and NBR, as made by the American Seal & Packing Company, Garlock of EnPro Industries, U.S. Rubber Supply Company, or equal.

W-10.05 Mechanical Joints

Mechanical joints shall meet the applicable requirements of AWWA C111/A21.11.

W-10.06 Push-on Joints

Push-on joints shall be of the bell and spigot type which employs a single, elongated grooved gasket to effect the joint seal. Push-on joints shall meet the applicable requirements of AWWA C111.

W-10.07 Wall Castings, Connecting Pieces, and Special Fittings

Wall castings and connecting pieces, such as bell and bell, bell and spigot, bell and flange, flange and flange, flange and spigot, and flange and flare, shall meet the requirements of ANSI Specification A21.10. Unless otherwise shown or specified, fittings 14 inches and larger shall have a pressure rating of 250 psi.

Where special fittings are required, they shall be of an approved design and shall have the same diameters and thickness' as standard fittings, unless otherwise required, but their laying lengths and other functional dimensions shall be determined by their positions in the pipelines and by the particular piping materials to which they connect.

Where water tightness is essential and at other locations where indicated, wall castings shall be provided with an integrally cast intermediate collar located at the center of the wall.

W-10.08 Sleeve-Type Couplings

Except where standard solid sleeves or split sleeves are shown or specified, sleeve-type couplings for ductile iron pipe shall be Style 38 couplings as made by Dresser Industries, Inc., or Type 411 as made by Smith-Blair, or equal. Gaskets shall be of molded rubber, Dresser Plain Grade 27, Smith-Blair 003, or equal. Middle rings shall be without a pipe stop and shall be at least 1/4 inch thick and 5 inches wide for 8-inch and smaller pipe, 3/8 inch thick and 7 inches wide for 10-inch through 30-inch pipe, and 1/2 inch thick and 10 inches wide for 36-inch and larger pipe with follower rings of appropriate thickness, unless otherwise shown or specified.

Sleeve-type couplings shall be shop coated with Dresser Red "D" Shop-Coat, Smith-Blair Standard Blue Shop Coat, or equal nontoxic material compatible with the finished coatings specified.

W-10.09 Coatings and Linings

Pipe which is to be buried shall have the standard outside coating specified in AWWA C151-8.1.

Unless otherwise shown on the Plans or specified, all ductile iron pipe and fittings shall be coated with 40 mils of Protecto 401 interior ceramic epoxy, or approved equal.

The weight and class designation shall be painted conspicuously in white on the outside of each pipe, fitting, and special casting after the shop coat has hardened.

W-10.10 Thrust Restraints

Unless otherwise shown on the Plans, specified or directed by the Engineer, concrete thrust blocks are not allowed.

Ductile iron pipe and fittings with mechanical joints shall be restrained by a device meeting the requirements of Workmanship and Materials section "Restraining Devices".

Ductile iron pipe and fittings with push-on joints that require restraining shall be Clow F-128 "Super Lock Joint," American Cast Iron Pipe "Lok-Fast Joint," U.S. Pipe and Foundry Company "TR Flex," or equal.

Where the glands are to be buried or not exposed to view, the assembly shall be given 2 heavy coats of asphalt varnish after installation.

W-10.11 Lining for Ductile Iron Gravity Pipe

Unless otherwise shown on the Plans or specified, all ductile iron pipe and fittings shall be coated with 40 mils of Protecto 401 interior ceramic epoxy, or approved equal.

W-10.12 Polyethylene Encasement

Unless otherwise shown on the Plans, specified or directed by the Engineer, polyethylene encasement shall be installed on all ductile iron pipe and fittings in accordance with AWWA/ANSI C105/A21.5.

Although not intended to be a completely air-and-water-tight enclosure, the polyethylene shall prevent contact between the pipe and the surrounding backfill.

Polyethylene encasement shall be installed in accordance with the pipe manufacturer's instructions, or in a manner acceptable to the Engineer. Polyethylene encasement shall extend 1 foot beyond the joint in both directions (a total of 2-foot overlap) and shall be adhered to said joint with 2-inch wide green marking tape. The slack width shall be taken up at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points. Upon installation of the encasement, any cuts or damaged portions of the polyethylene encasement shall be securely mended with tape or with a short length of polyethylene sheet, or a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.

Backfill material shall be the same as specified for pipe without polyethylene wrapping; however, extra care should be taken that the backfill be free from cinders, refuse, boulders, rocks, stones, or other materials that could damage the encasement. Special care shall be taken to prevent damage to the polyethylene wrapping when placing backfill.

Because prolonged exposure to sunlight will deteriorate polyethylene film, such exposure prior to backfilling the wrapped pipe shall be kept to a minimum.

W-10.13 Ductile Iron Pipe Exterior Coating

All pipe and fittings shall have an exterior asphaltic coating conforming to the following requirements:

Viscosity, KU at 25 degrees C	56-60
Flashpoint, degrees F (TCC)	40 degrees F Min
Dry set to touch, minutes	6
Dry hard, minutes	22

W-10.14 Force Main Identification

Ductile iron pipe sanitary force main shall be continuously spiral wrapped with 2-inch wide green stick-on vinyl tape prior to installation for permanent identification purposes. The tape shall

have a minimum thickness of 6 mils with a minimum tensile strength of 22 pounds per inch and a minimum adhesive factor of 40 ounces per inch. The pipe shall be clean and dry when wrapped.

* * *

SECTION 11 - PVC PIPE GRAVITY

W-11.01 General

All pipe and fittings, 6"-27" nominal diameter, shall be solid wall Polyvinyl Chloride (PVC) Pipe **MANUFACTURED** to standards as outlined in the following sections.

All references to ASTM Designations shall include Manufacturing (PVC Cell Classification) and Performance (Inspection, Sampling and Testing) Specifications, and the most recent shall govern. Pipe and fittings meeting **ONLY** the Performance Test Specification will not be acceptable. The minimum nominal diameter for mainline pipe is 8 inches and for laterals is 6 inches. The maximum laying length shall be 13.0 feet.

W-11.02 Standards (6"-15" Diameter)

Solid wall PVC pipe shall comply with ASTM D 3034 and all applicable ASTM documents as covered in Section No. 2 of ASTM D 3034. All pipe and fittings shall be made of PVC plastic having cell classifications as outlined in Section No. 5 "Materials" of ASTM D 3034 and as defined in ASTM D 1784. For depths of cut through 18 feet, a minimum wall thickness of SDR-35 is required. For depths of cut greater than 18 feet, a minimum wall thickness of SDR-26 is required. Fittings shall be either integrally cast (factory molded) or factory solvent welded and a separate section from the mainline pipe. SDR-26 fittings shall be used with SDR-26 pipe.

W-11.03 Standards (18"-27" Diameter)

Solid wall PVC pipe and fittings shall comply with ASTM F 679 and all applicable ASTM documents as covered in Section No. 2 of ASTM F 679. All pipe and fittings shall be made of PVC plastic having cell classifications as outlined in Section No. 4 "Materials" of ASTM F 679 and as defined in ASTM D1784. All pipe and fittings shall meet the wall thickness and cell classification requirements of either T-1 or T-2 of Table 1 "Pipe Dimensions and Minimum Pipe Stiffness" of ASTM F 679. Fittings shall be either integrally cast (factory molded) or factory solvent welded and a separate section from the mainline pipe.

W-11.04 Joints (6"-27" Diameter)

Joints for solid wall PVC pipe and fittings shall be gasket, bell and spigot, push-on type. Joints shall be a molded integral part of the pipe section. Joints or couplings furnished loose shall not be permitted. Solvent cemented joints shall not be permitted. Lubricant shall be as recommended by the pipe manufacturer. (Assembly of gasketed joints is outlined in the Section "Joining of PVC Pipe").

Joints for pipe and for fittings shall comply with ASTM D 3212 "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals." Elastomeric gaskets shall meet the requirements of ASTM F 477. Joints for pipe and fittings shall comply with ASTM D 3034 for 6"-15" diameter, ASTM F 679 for 18"-27" diameter, and ASTM F 1336 for 6"-27" diameter.

W-11.05 Pre-installation Tests, Reports, Markings and Submittals

All 6"-15" pipe and fittings shall be marked per Section No. 12 "Marking" of ASTM D 3034. All 18"-27" pipe and fittings shall be marked per Section 11 "Marking" of ASTM F 679. All required information shall be marked on the pipe. If in code, the markings shall be decoded in writing by letter to the City in advance.

PRIOR TO SHIPMENT of the pipe and fittings to the project site, the Contractor shall submit to the Engineer certifications as described below duly certified by the manufacturer's testing facility or an independent certified testing laboratory demonstrating full compliance with the applicable ASTM specifications described above. Certification from the supplier is **not** acceptable.

An original plus four (4) copies of the following shall be submitted to the Engineer.

1. The name, address, and phone number of the pipe and fittings manufacturer and the location of the plant at which they will be manufactured.
2. A letter of certification stating that each lot of pipe used on this project has been manufactured, sampled, tested, and conforms to Section 8 "Test Methods" of ASTM D 3034 for 6"-15" diameter and Section 7 "Test Methods" of ASTM F 679 for 18"-27" diameter pipe. A letter of certification from the fittings manufacturer shall be provided stating that all fittings conform with ASTM D 3034 for 6"-15" diameter, ASTM F 679 for 18"-27" diameter, and ASTM F 1336 for 6"-27" diameter.

W-11.06 Bedding Requirements

Unless otherwise indicated on the Plans, solid wall PVC pipe shall be installed with Class "C" bedding as described in Section W-2 - Backfilling." If soil conforming to subsection W-2.04 "Select Fill Material-Sand" is not excavated at the project site, it shall be imported. Compaction requirements are described in subsection W-2.07 "Bedding Placement for Pipelines." In no case shall a concrete cradle be used. In the event the Plans call for or the Contractor opts to install crushed stone, it shall be NO GREATER THAN a #57 stone.

W-11.07 Post-installation Tests

SCOPE:

Prior to final acceptance of the project all PVC pipelines shall be leakage tested, deflection tested, and T.V inspected, all at the expense of the Contractor. The leakage test shall be performed by the Contractor or a Wastewater Department approved test lab after the subbase has been compacted. The Contractor or a Wastewater Department approved test lab shall perform the deflection testing. The deflection test shall be performed a minimum of 7 days after the base has been compacted and sealed. The Contractor shall perform the T.V. inspection only **AFTER** the pipelines have passed both the leakage and deflection tests.

DEFLECTION TESTING:

A deflection test shall be performed on all new gravity sewers to ensure that the pipe is not out of round, contains deflected or off-sets joints, or other defects. The Contractor shall have the option of testing for 5% deflection after the base has been compacted and sealed for a minimum of

7 days; or for 7½% deflection after the base has been compacted and sealed for a minimum of 30 days. The maximum installed deflection shall not exceed 5% or 7-1/2% of the base inside diameter of the pipe as listed in the following table:

INCHES
SDR-35

<u>Nominal Size</u>	<u>Base Inside Diameter</u>	5% Deflection after 7 days <u>Mandrel</u>	7-1/2% Deflection after 30 days <u>Mandrel</u>
8	7.665	7.28	7.09
10	9.563	9.08	8.85
12	11.361	10.79	10.51
15	13.898	13.20	12.86

TYPE T-1

18	16.976	16.13	15.70
21	20.004	19.01	18.50
24	22.480	21.36	20.79
27	25.327	24.06	23.43

SDR-26

<u>Nominal Size</u>	<u>Base Inside Diameter</u>	5% Deflection after 7 days <u>Mandrel</u>	7-1/2% Deflection after 30 days <u>Mandrel</u>
8	7.488	7.11	6.93
10	9.342	8.87	8.64
12	11.102	10.55	10.27
15	13.575	12.90	12.56

TYPE T-2

18	17.054	16.20	15.77
21	20.098	19.09	18.59
24	22.586	21.46	20.89
27	25.446	24.17	23.54

If the pipe fails the 7 day, 5% deflection test, the Contractor shall immediately conduct a 7-1/2% deflection test. If the pipe passes the 7-1/2% deflection test, the Contractor has the option of repairing that section at that time or waiting until a minimum of 30 days after the base has been compacted and sealed and then re-testing for a maximum of 7-1/2% deflection.

If the pipe fails the 7-1/2% deflection test after 7 days or at 30 days, the Contractor shall repair

that section immediately.

If the Contractor performs the deflection testing rather than employing an approved test lab, the following shall apply:

The Contractor shall furnish the mandrel, labor, materials, and equipment necessary to perform the tests as approved by the Engineer. The mandrel shall be pulled through by HAND or a HAND operated reel in the presence of the Engineer. Prior to performing the deflection tests, the Contractor shall submit to the Engineer certification that the 9-arm mandrels are preset as stated above. Each mandrel shall be engraved with the following:

Serial Number
Nominal pipe diameter
Either "ASTM D 3034," year and either "SDR-35" or "SDR26"
or "ASTM F 679," year and either "Type T-1" or "Type T-2"
% deflection as stated above.

If the mandrel fails to pass any section of pipe, the Contractor shall excavate and make all repairs necessary to correct the excessive deflection. The Contractor shall then backfill, recompact, and reseal the permanent pavement base, and retest the line. If the mandrel fails to pass a second time, the section shall be replaced. Re-rounding is **NOT** permitted.

Leakage Testing

The Contractor or a reputable test lab shall perform either an infiltration, exfiltration or an air leakage test as authorized by the Engineer. If the groundwater level is two (2) feet or more above the crown of the pipe, an infiltration test must be performed. The Contractor shall notify the Engineer of the date and time of the test a minimum of 5 days prior to the test.

The infiltration/exfiltration tests shall be performed as described in Section W-18.

AIR TESTING - The minimum time duration permitted for pressure drops of 1.0 psi and 0.5 psi are shown in Tables I and II on the following page and are based on a maximum allowable exfiltration rate of 0.0015 cu. ft./min./sq. ft. of internal pipe surface. Derivations may be found in the Uni-Bell PVC Pipe Association publication: "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe," UNI-B-6-85. (Available from Uni-Bell, 2655 Villa Creek Drive, Suite 155, Dallas, Texas 75234.

The test shall commence after the plugged line has reached a stabilized gauge pressure of 4.0± 1/2 psi. Air testing equipment shall be arranged so that it is located at the ground surface and shall have an approved air relief arrangement to prevent the sewer from being pressurized to greater than 9.0 psig.

If the pressure drops 1.0 psig (or 0.5 psig) before the appropriate time shown in Table I (Page W11-8) or Table II (Page W11-9) has elapsed, the line has failed. In such case, the Contractor shall structurally repair or replace all defective materials and/or workmanship to the satisfaction of the Engineer.

Sealants are **NOT** permitted. The completed pipe installation shall then be retested.

The lengths of lateral sewers may be ignored for computing required test times. In the event a test section (mainline and laterals), having a combined total internal surface area less than 625 square feet, fails to pass the air test when laterals have been ignored; the test time may be reduced per Section 9.4 of UNI-B-6-85. If the reduced test time is short enough to allow the section to pass, the computations shall be included with the test results.

TV Inspection

All completed gravity sewers shall be subject to two TV inspections. The first TV inspection shall be performed after the new gravity sewer has passed both the leakage test and the deflection test. An additional TV inspection shall be performed eleven (11) months from the date the City has accepted the wastewater facilities. The inspection shall be used to identify deficiencies such as cracked pipe, leaking joints, damaged connections, and depressions or dip in the pipe alignment (see below for allowable dips). Any deficiencies identified by the inspections shall be repaired by the Contractor at no cost to the City.

The TV inspections shall be completed by the Contractor or a private company that specializes in TV inspection. The TV inspected shall be completed by means of a closed-circuit color television. Prior to the inspection of newly constructed collection systems, water shall be run through the pipeline so that depressions or dips can be identified during the inspection. TV inspections shall be completed in accordance with Section W-72 TV Inspection.

If the TV inspection identifies standing water in the pipe revealing a depression or dip in the pipe alignment, the magnitude of the depression shall be approximated by a means approved by the City. Approved methods include attaching a cylinder, disc, or ball of distinct size in front of the camera during the inspection. For example, if a 1” diameter disc is utilized and is totally submerged during the inspection, the depression is approximated to be greater than 1-inch. Listed below is the allowable depth of depression for the various pipe sizes. Depressions exceeded the allowable limits shall be repaired by the Contractor at no cost to the City.

Pipe Diameter	Minimum Dip for Failure
8” – 10”	1.0”
12” – 16”	1.5”
18” – 24”	2.0”

W-11.08 Joining of PVC Pipe

The assembly of gasketed joints shall be performed as recommended by the pipe manufacturer. In all cases, clean the gasket and bell, especially the groove area and the spigot area with a rag, brush, or paper towel to remove any dirt or foreign material before the assembly. Lubricant shall be applied as specified by the pipe manufacturer.

Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Apply firm steady pressure either by hand or by bar and block assembly until the spigot

easily slips through the gasket.

If undue resistance to insertion of the pipe end is encountered or the reference mark does not position properly, disassemble the joint and check the position of the gasket. If it is twisted or pushed out of its seat ("fish-mounted"), inspect components, repair or replace damaged items, clean the components, and repeat the assembly steps. Be sure both pipe lengths are in concentric alignment. If the gasket was not out of position, verify proper location of the reference mark.

To join field-cut pipe, first square cut the pipe end. Use a factory-finished beveled end as a guide for proper bevel angle and depth of bevel plus the distance to the insertion reference mark. Bevel the end using a pipe beveling tool or a wood rasp which will cut the correct taper. Round off any sharp edges on the leading edge of the bevel.

W-11.10 Joining PVC Pipe to Clay Pipe

The joining of PVC to clay pipe shall be accomplished with flexible compression couplings. Couplings shall include stainless steel shear rings and stainless steel compression bands. Such couplings shall meet the requirements of ASTM Des: C 425, ASTM C1173 and shall be Series No. 1002 flexible polyvinyl chloride couplings with stainless steel compression bands and shear rings as manufactured by Fernco Joint Sealer Co., Ferndale, Michigan; Band-Seal couplings as manufactured by Mission Clay Products Corp., Whittier, California; or equal. Installation of flexible couplings shall be done in accordance with the manufacturer's instructions.

After the joint has been completed, any voids in the excavation beneath the coupling shall be thoroughly tamped full of granular fill material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

W-11.11 Joining PVC Pipe to Ductile Iron Pipe

The joining of PVC pipe to ductile iron pipe shall be accomplished with rigid PVC C900 x SDR-35 adapter couplings. Such couplings shall be molded of PVC material meeting ASTM D-1784 specifications. Joints shall meet ASTM D-3213 requirements with gaskets conforming to ASTM F-477. The adapter couplings shall be manufactured by Harco, Lynchburg, Virginia, or equal. Installation of rigid couplings shall be done in accordance with the manufacturer's instructions.

After the joint has been completed, any voids in the excavation beneath the coupling shall be thoroughly tamped full of granular fill material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

W-11.12 Connection to Manholes

The Contractor will be required to submit a shop drawing, detailing the method of connecting the proposed pipe to the manhole and making it watertight. For connecting PVC pipe, the Contractor shall use a flexible rubber boot, precast into the manhole. The boot shall have stainless steel bands to compress and seal to the proposed pipe or shall be a compression type, such as A-Lock.

Should the flexible rubber boot need to be relocated when connecting to an existing manhole, the Contractor shall perform the connection by one of two methods. The preferred method is to core the manhole and install a rubber boot. The rubber boot shall be manufactured by Kor-n-Seal, or equal.

The boot shall be installed and the PVC pipe connection shall be in accordance with the manufacturer's instructions. If the manhole cannot be cored or if the manhole is constructed of brick, the connection shall be made with a PVC manhole adapter which has an exterior impregnated silica surface layer. The adapter shall be manufactured by GPK Products, Inc., Fargo, North Dakota, or equal. The adapter shall be installed and grouted into the manhole wall in accordance with the manufacturer's instructions with non-shrink grout. The PVC pipe shall be inserted through the adapter.

W-11.13 Storage of PVC Pipe

Pipe shall be stored at the job site in unit packages provided by the manufacturer. Caution shall be exercised to avoid compression, damage, or deformation to bell ends of the pipe. When unit packages of PVC pipe are stacked, ensure that the weight of upper units does not cause deformation to pipe in lower units.

PVC pipe unit packages shall be supported by racks or dunnage to prevent damage to the bottom during storage. Supports shall be spaced to prevent pipe bending.

PVC pipe shall not be stored close to heat sources or hot objects such as heaters, boilers, steam line, engine exhaust, etc.

When unit packages of PVC pipe are stacked, ensure that the height of the stack does not result in instability which could cause stack collapse, pipe damage, bodily injury, and property damage.

The interior as well as all sealing surfaces or pipe, fittings, and other accessories shall be kept free from dirt and foreign matter.

Gaskets shall be protected from excessive exposure to heat, direct sunlight, ozone, oil and grease.

W-11.14 Handling of PVC Pipe - Standard Procedures

When using fork lifts or other handling equipment, prevent damage to PVC pipe.

When handling PVC pipe, avoid severe impact blows, abrasion damage and gouging or cutting by metal surfaces or rocks. Avoid stressing bell joints and damage of bevel ends.

Pipe shall be lowered, not dropped, from trucks and into trenches.

In preparation for pipe installation, placement (stringing) of pipe shall be as close to the trench as practical and on the opposite side from excavated earth. Bell ends shall point in the direction of work progress.

The Engineer may reject any pipe that shows visible signs of damage resulting from poor storage and handling practices.

TABLE I

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)									
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft		
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:26	9:26	11:52	13:51	15:49	17:48	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	28:29	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04	44:52	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	64:10	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	87:15	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	113:57	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	144:23	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	178:03	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53	215:25	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46	256:25	230:46

TABLE II

SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)									
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft		
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	9:58	12:50
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	15:35	20:02
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	22:26	28:51
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	30:32	39:16
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	43:35	51:17
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	57:42	66:54
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	66:54	74:07	80:07
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	88:51	96:57
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	107:43	115:23
36	17:00	66	15.483 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	128:12	141:01

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 4 headed "Concrete and 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.

The exterior of all precast manholes shall have a 15 mil dry thickness of Sherwin Williams Targuard® Coal Tar Epoxy or approved equal. The interior shall be lined with AGRU ULTRAGRIP HDPE Concrete Protective Liner for Precast Applications or approved equal with a minimum thickness of three millimeters (3 mm).

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 shall 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 limestone screenings.

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-12.04 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 Lump Sum, 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 Engineer 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.

* * *

SECTION 15 - LAYING AND JOINTING PIPE
FOR FORCE MAINS AND SEWERS

W-15.01 General

The installation, delivery, transportation, unloading, and stringing of pipes, fittings, and accessories for force mains and sewers shall be done in accordance with AWWA C600 for ductile iron pipe and ASTM Des: C 12 for clay and concrete pipe and ASTM D 2321 and pipe manufacturer's recommendations for PVC pipe, as modified or supplemented by the specifications of this section and by the details shown on the Plans.

Proper and suitable tools and appliances for the safe and convenient cutting, handling, and laying of the pipe and fittings shall be used.

Suitable fittings shall be used where shown and at connections where grade or alignment changes require offsets greater than those recommended by the pipe manufacturer.

Pipes and fittings shall be thoroughly cleaned before they are laid and shall be kept clean until they are accepted in the completed work.

All lines shall be closed off with bulkheads when pipe laying is not in progress.

Before being laid, all pipe and specials shall be thoroughly examined for defects, and no piece shall be installed which is known to be defective. If any defective piece should be discovered after having being installed, it shall be removed and replaced with a sound one in a satisfactory manner by the Contractor at his own expense.

Pipe shall be thoroughly cleaned before it is laid and shall be kept clean until it is accepted in the completed work. Special care shall be exercised to avoid leaving bits of wood, dirt, and other foreign particles in the pipe. If any such particles are discovered before the final acceptance of the work, they shall be removed and the pipe cleaned at the Contractor's expense.

Pipe laying for sewers shall begin at the low end of a run and proceed upgrade. Generally, all such pipe shall be laid with bells or grooves pointing uphill. Each pipe shall be carefully placed and checked for line and grade.

Adjustments to bring pipe to line and grade shall be made by scraping away or filling in granular material under the body of the pipe, but in no case by wedging or blocking up the barrel. The faces of the spigot ends and the bells shall be brought into fair contact, and the pipe shall be firmly and completely shoved home. As the work progresses, the interior of the pipelines shall be cleaned of all dirt and superfluous materials of every description. All lines shall be kept absolutely clean during construction. Pipelines shall be laid accurately to line and grade.

Gaskets for pipe joints shall be stored in a cool place and protected from light, sunlight, heat, oil, or grease until installed. Any gaskets showing signs of checking, weathering, or other deterioration will be rejected.

Pipe shall be of the types, sizes, and classes shown on the Plans.

Each piece of pipe shall be inspected and cleaned before it is lowered in the trench and any lumps or projections on the face of the spigot or tongue end or the shoulder shall be cut away. No cracked, broken, or defective pieces shall be used in the work.

Concrete pipe manufactured with a plastic sheet liner shall be laid so that the liner is on the crown of the pipe and placed symmetrically about the vertical centerline of the pipe.

Pipe laying will be permitted only in dry trenches having a stable bottom. Where groundwater is encountered, the Contractor shall make every effort to secure an absolutely dry trench bottom.

If, in the opinion of the Engineer, the Contractor has failed to obtain an absolutely dry trench bottom by improper or insufficient use of all known methods of trench dewatering, the Engineer may then order the Contractor to excavate below grade and place sufficient selected fill material, crushed stone, or Class D concrete over the trench bottom at the Contractor's own expense.

If all efforts fail to obtain this condition and the Engineer determines that the trench bottom is unsuitable for pipe foundation, he will order in writing the kind of stabilization to be constructed.

W-15.02 Transportation and Delivery

Every precaution shall be taken to prevent injury to the pipe during transportation and delivery to the site. Extreme care must be taken in loading and unloading the pipe and fittings. Such work must be done slowly with skids or suitable power equipment, and the pipe shall be under perfect control at all times. Under no condition shall the pipe be dropped, bumped, dragged, pushed, or moved in any way which will cause damage to the pipe or coating. When handling the pipe with a crane, a suitable pipe hook or sling around the pipe shall be used. Under no condition shall the sling be allowed to pass through the pipe unless adequate measures are taken to prevent damage to the pipe ends.

If in the process of transportation, handling, or laying, any pipe or special is damaged, such pipe or pipes shall be replaced or repaired by the Contractor at his own expense.

The Contractor shall furnish and install suitable blocking and stakes so as to prevent the pipe from rolling. The type of blocking and stakes, and the method of installation, shall be approved by the Engineer.

W-15.03 Pipe Laying - Trenches

Pipelines shall be laid in trench excavation on bedding material as specified under the Workmanship and Materials section headed "Backfilling," Class D concrete cradle or other foundations as shown on the Plans, specified, or ordered in writing by the Engineer. The pipe shall be properly secured against movement and pipe joints shall be made in the excavation as required. The pipe bedding shall be carefully graded, compacted, and formed to fit the bottom quadrant of the pipe. Bell holes shall be cut out for each joint as required to permit the joint to be properly made and allow the barrel of the pipe to have full bearing throughout its length.

Where pipelines are laid in Class D concrete cradle or encasement, the installation shall

conform to the requirements of the Workmanship and Materials section headed "Pipe Cradles and Encasements."

Pipelines laid on other type foundations shall be installed as specified for such other foundations or as directed in writing by the Engineer.

W-15.04 Lateral Detection Tape

Detectable underground marking tape shall be installed over all laterals from the edge of pavement to the property line. The tape shall be Lineguard encased aluminum foil, or equal. The 2-inch wide tape shall be APWA green and reverse printed bearing the identification of the sewer line below it and a warning such as "CAUTION."

The tape shall be buried 4-6 inches. After trench backfilling, the tape shall be placed in the backfill and allowed to settle into place with the backfill.

W-15.05 Mechanical Joints for Ductile Iron Pipe

In making up mechanical joints, the spigot shall be centered in the bell. The surface with which the rubber gasket comes in contact shall be cleaned thoroughly and the gasket shall be washed thoroughly with soapy water just prior to assembly of the joint. The gasket and gland shall be placed in position, the bolts inserted, and the nuts tightened fingertight. The nuts then shall be tightened by means of a torque wrench in such a manner that the gland shall be brought up evenly into the joint. The following range of bolt torques shall be applied:

<u>Bolt Size</u> <u>Inches</u>	<u>Range of Torque</u> <u>Foot-Pounds</u>
5/8	45 - 60
3/4	75 - 90
1	80 - 100
1-1/4	105 - 120

If effective sealing is not obtained at the maximum torque listed above, the joint shall be disassembled and reassembled after a thorough cleaning.

All bolts and nuts shall be field coated with a bituminous coating after assembly of the joint.

W-15.06 Push-on Joints for Ductile Iron Pipe

In making up push-on joints, the gasket seat in the socket shall be cleaned thoroughly and the rubber gasket shall be wiped clean with a cloth. The gasket shall be placed in the socket and a thin film of lubricant shall then be applied to the inside surface of the gasket that will come in contact with the entering pipe. The plain end of the pipe to be entered shall be cleaned thoroughly and placed in alignment with the bell of the pipe to which it is to be joined. The joint shall be made up by exerting sufficient force on the entering pipe so that its plain end is moved past the gasket until it makes contact with the base of the socket.

W-15.07 Joining Clay Pipe

The joining of clay pipe with flexible plastic joints shall be done in accordance with the manufacturer's instructions. The joint surface on both the bell and spigot ends shall be wiped clean and coated with a lubricant furnished by the manufacturer to facilitate assembly. The spigot end shall be inserted in the bell and pressure applied sufficient to seat the pipe properly. After the joint has been completed, any voids in the excavation beneath the spigot shall be thoroughly tamped full of granular fill material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

W-15.08 Joining of PVC Pipe-Gravity

The assembly of gasketed joints shall be performed as recommended by the pipe manufacturer. In all cases clean the gasket and bell, especially the groove area and the spigot area, with a rag, brush or paper towel to remove any dirt or foreign material before the assembly. Lubricant shall be applied as specified by the pipe manufacturer.

Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Apply firm steady pressure either by hand or by bar and block assembly until the spigot easily slips through the gasket.

If undue resistance to insertion of the pipe end is encountered or the reference mark does not position properly, disassemble the joint and check the position of the gasket. If it is twisted or pushed out of its seat ("rolled"), inspect components, repair or replace damaged items, clean the components, and repeat the assembly steps. Be sure both pipe lengths are in concentric alignment. If the gasket was not out of position, verify proper location of the reference mark.

To join field-cut pipe, first square cut the pipe end. Use a factory-finished beveled end as a guide for proper bevel angle and depth of bevel plus the distance to the insertion reference mark. Bevel the end using a pipe beveling tool or a wood rasp which will cut the correct taper. Round off any sharp edges on the leading edge of the bevel.

W-15.09 Joining Concrete Pipe

Before joining concrete pipe using flexible rubber gaskets, the joint surfaces of both the bell and spigot (tongue and groove) ends shall be wiped clean. Any lumps, projections, burrs, or chips which would interfere with the proper compression of the gasket shall be repaired. The spigot or tongue end with the gasket in place and with all surfaces lubricated as recommended by the manufacturer, shall be inserted into the bell or groove. Pressure shall be applied to seat the pipe properly in the bell or groove. Voids under the pipe shall be tamped full of granular material to provide full bearing for the pipe.

Curves for reinforced concrete pipe sewers shall be constructed with standard pipe where the opening of the joint on the outside of the curve is less than 1/2 inch. Where greater opening of the joint would be required, the curves shall be constructed using beveled or radius pipe with standard joints.

Curves for reinforced concrete pressure pipe or prestressed concrete pipe shall be constructed with standard pipe sections, where the opening of the joint on the outside of the curve is less than 1/2 inch, or with beveled pipe, precast elbows or combination of these methods.

W-15.10 Concrete Pipe Rubber Gasket Joints

Rubber gaskets shall be of the O-ring type or equivalent cross section approved by the Engineer. The composition and properties of the gaskets for gravity flow sewers shall meet the requirements of ASTM Des: C 443.

Composition and properties for concrete pressure pipe gaskets shall meet the requirements of the specifications for the concrete pressure pipe with which the gasket will be used.

In making O-ring rubber gasketed joints, the gasket and the pipe socket shall be lubricated with an approved rubber gasket lubricant, and the gasket shall be stretched over the spigot and placed accurately in position. The tongue or spigot end shall be carefully centered in the socket of the preceding pipe so as to avoid displacement of the gasket, and the pipe shall be drawn home fully compressing the gasket. Adjustments to line and grade shall be made in such a manner that the compressed rubber gasket will not be disturbed. Before proceeding with backfilling, the joint shall be felt completely around to determine whether the gasket is in its proper position. If the gasket can be felt out of place, the pipe shall be withdrawn and the gasket examined for cuts or breaks. If the gasket has been damaged, it shall be replaced with a new one before the pipe is replaced.

Rubber gaskets shall be stored in a cool place and protected from light, sunlight, heat, oil, or grease until installed. Any gaskets showing signs of checking, weathering, or other deterioration will be rejected.

W-15.11 Temporary Bulkheads

At the ends of contract sections, where adjoining pipelines have not been completed, and in connections built into pipelines where adjoining pipelines or structures have not been completed and are not ready to be connected, temporary bulkheads, approved by the Engineer, shall be built. Such bulkheads encountered in connecting sewers or structures included in the Contract, or pipelines or structures previously built, shall be removed by the Contractor when the need for them has passed or when ordered by the Engineer.

W-15.12 Testing

The testing of pipelines shall be done in accordance with the requirements of the Workmanship and Materials section headed "Leakage Tests."

W-15.13 Joining Different Types (Clay, PVC, or Ductile Iron) of Pipe

The joining of clay pipe to ductile iron pipe or clay pipe to PVC pipe, shall be accomplished with flexible compression couplings. Couplings shall include stainless steel shear rings and stainless steel compression bands. Such couplings shall meet the requirements of ASTM DES: C 425, ASTM C1173 and shall be Series No. 1002 flexible polyvinyl chloride couplings with stainless steel compression bands and shear rings as manufactured by Fernco Joint Sealer Co., Ferndale, Michigan; Band-Seal couplings as manufactured by Mission Clay Products Corp., Whittier, California; or approved equal. After the joint has been completed, any voids in the excavation beneath the coupling

shall be thoroughly tamped full of granular fill material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

The joining of SDR-35 or SDR-26 PVC pipe to ductile iron or C-900 PVC pipe, shall be accomplished with rigid PVC C900 x SDR-35 adapter couplings. Such couplings shall be molded of PVC material meeting ASTM D-1784 specifications. Joints shall meet ASTM D-3213 requirements with gaskets conforming to ASTM F-477. The adapter couplings shall be manufactured by Harco, Lynchburg, VA, or equal. Installation of rigid couplings shall be done in accordance with the manufacturer's instructions. After the joint has been completed, any voids in the excavation beneath the coupling shall be thoroughly tamped full of granular fill material to provide a full bearing for the pipe and prevent excessive pressure on the bottom of the joint.

W-15.14 Connection to Manholes

The Contractor will be required to submit a shop drawing, detailing the method of connecting the proposed pipe to the manhole and making it watertight:

1. For connecting vitrified clay or ductile iron pipe, the Contractor shall use nonshrink grout to seal the opening between the pipe O.D. and manufactured opening in the manhole or flexible rubber boot, precast into the manhole. The boot shall have stainless steel bands to compress and seal to the proposed pipe or shall be a compression type, such as A-Lock.
2. For connecting PVC pipe, the Contractor shall use a flexible rubber boot, precast into the manhole. The boot shall have stainless steel bands to compress and seal to the proposed pipe or shall be a compression type, such as A-Lock. Should the flexible rubber boot need to be relocated or when connecting to an existing manhole, the Contractor shall perform the connection by one of two methods. The preferred method is to core the manhole and install a rubber boot. The rubber boot shall be manufactured by Kor-n-Seal, or equal. The boot shall be installed and the PVC/P connection shall be in accordance with the manufacturer's instructions. If the manhole cannot be cored or if the manhole is constructed of brick, the connection shall be made with a PVC manhole adapter which has an exterior impregnated silica surface layer. The adapter shall be manufactured by GPK Products, Inc., Fargo, ND, or equal. The adapter shall be installed and grouted into the manhole wall in accordance with the manufacturer's instructions with nonshrink grout. The PVC/P shall be inserted through the adapter.

W-15.15 Joint Grouting

Joints for concrete pipelines using rubber gaskets and steel end rings shall be grouted on the outside with cement mortar composed of one part Type IA portland cement to one part sand by volume. The materials shall be thoroughly mixed to produce a uniform mortar with all aggregate particles well coated.

The joint grouting shall not advance closer than two pipe lengths to the laying operations. In grouting the joint, a cloth diaper shall be used to encase the outside diameter of the bell of the pipe and adequately straddle the joint recess so as to keep out dirt and to serve as a form for grouting. The

joint space shall be filled with cement mortar, just thin enough to run around the joint. The diaper is to be left in place permanently. Before the mortar has taken its initial set, the diaper shall be examined, and if not completely filled, additional mortar shall be forced into the joint.

* * *

SECTION 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 crushed concrete or similar material, 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.

Crushed concrete or similar material placed in areas where the existing pavement is shell, limerock, crushed stone, or other similar material shall be classified as nonpermanent pavement, will not be measured for separate payment.

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 Lump Sum price.

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. 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 included in the Lump Sum Price.

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 Lump Sum price 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 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) ₁ or 96.0 (lab density sample) ₂ & above	100
94.0 to < 95.0 ₁ or 96.0 ₂	95
<u>Percent of Control Strip Density</u>	<u>Percent of Payment</u>
93.0 to < 94.0 (Applies to both ₁ & ₂)	90

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 17 - LAWN REPLACEMENT

W-17.01 General

The Contractor shall replace all lawn areas which have been removed or damaged due to construction. Lawn replacement includes fine grading the areas to be restored and furnishing and placing topsoil, fertilizer, sod, sprigs, seeding, and maintaining all areas. Grassing and mulching or sodding lawn areas will be required as directed.

Sod shall be Argentine Bahia, St. Augustine, or other approved native grass sod, and shall be well matted with grass roots. It shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of 2 inches. The sod shall be live, fresh and uninjured, and shall contain sufficient moisture at the time of planting to induce growth. The type and quality of sod shall be approved by the Engineer before placing.

Grass seed shall be Argentine Bahia, 60 #/acre from March 1 to November 1; 50 #/acre with 20 #/acre of rye grass seed from November 1 to March 1. Argentine Bahia seed shall be a scarified seed having a minimum active germination of 40% and total of 85%.

Mulch material shall be free of weeds and shall be oat straw or rye, Pangola, peanut, Coastal Bermuda or Bahia grass hay.

W-17.02 Topsoil

Where areas are to be restored by sodding, topsoil shall be placed to a minimum compacted depth of 2 inches over the subgrade. Where areas are to be restored by grassing, topsoil shall be placed to a minimum compacted depth of 4 inches over the subgrade. All topsoil shall be suitable excavated topsoil which has been segregated or other topsoil material approved by the Engineer. Topsoil shall be free from stones, roots, sticks, or other foreign substances.

W-17.03 Water

The Contractor shall furnish at his own expense all water required for lawn replacement and maintenance of the work until final acceptance.

W-17.04 Construction Methods

Prior to sodding or grassing, the Contractor shall fine grade the subgrade to 4 inches below finished grade. Topsoil shall be spread over the subgrade to a uniform depth and density. Topsoil shall be uniformly compacted by a light hand roller weighing between 250 and 750 pounds to the specified depths for sodding or grassing.

Immediately before sodding, 14-4-14 or 15-0-15 fertilizer shall be applied at the rate of approximately 600 pounds per acre, either in the furrows or by broadcasting and raking, into the planting area. After the surface has been properly prepared, the sod shall be placed and firmly embedded by light tamping. Additionally, dolomite (lime) shall be applied at a rate of 2 tons per acre.

Immediately after the sod has been planted, if the soil does not contain sufficient moisture to ensure

growth, water shall be applied twice daily for the first week, once in the morning or late evening and once at approximately 2:00 P.M. Water shall then be applied once a day over the next 2 weeks and alternating days for an additional 2 weeks. If rooting has not taken place by the end of the third week, 1 daily watering shall continue until sod is firmly rooted.

One week after the sod has been planted, a complete fertilizer with minor elements shall be applied weekly at the rate of 1# nitrogen per 1,000 square foot in a 2-1-2 or 4-1-2 formula for a period of 4 weeks, and thereafter every 2 weeks for an additional 30 days. The ground shall not be wet when the fertilizer is applied but will be immediately watered after application of the fertilizer to remove it from the leaf area.

Prior to grassing, 14-4-14 or 15-0-15 fertilizer shall be applied to the soil at the rate of approximately 300 pounds per acre. Grass seed at the specified rate per acre shall then be raked into the soil and covered with mulching material. The area shall then be thoroughly rolled with approved equipment.

After the grass has been planted, if the soil does not contain sufficient moisture to ensure growth, water shall be applied as directed by the Engineer. After the grass has started growing, fertilizer shall be applied uniformly over the area weekly, at a rate of 0.5# nitrogen and potash per 1,000 square feet, until turf cover the area. The fertilizer shall not be applied unless the surface of the ground or sod is sufficiently moist to quickly dissolve the fertilizer.

W-17.05 Caretaking

The Contractor shall keep all replaced lawn areas in good, healthy, insect free, moist condition by watering, replanting or resodding, weeding, fertilizing, and cutting as specified, and directed by the Engineer.

* * *

SECTION 18 - LEAKAGE TESTS

W-18.01 General

All pipelines will be tested and inspected for infiltration or leakage by the Contractor under the direction of the Engineer. All tests and inspections will be conducted in a manner to minimize as much as possible any interference with the Contractor's work or progress.

The Contractor shall notify the Engineer when the work is ready for testing and inspecting, and tests and inspections shall be made as soon thereafter as practicable under the direction of the Engineer. Personnel for reading meters, gauges, or other measuring devices will be furnished by the Contractor. The Contractor shall also furnish all other labor, materials, services, and equipment, including power, fuel, meters and gauges, pumps, bulkheads, backflow preventers, water, and other items and apparatus necessary for making leakage tests, preparing pipelines for testing, assembling, placing, and removing testing equipment, and placing pipelines in service, all to the satisfaction of the Engineer. Only City water shall be used for testing unless otherwise approved by the Engineer. The water shall be obtained and metered from sources approved by the Engineer. After testing, the water shall be disposed of by the Contractor into storm sewers or drainage courses approved by the Engineer.

W-18.02 Tests of Sewer - General

All sewers shall be tested for infiltration or leakage after completion of backfilling. All wyes, house connections, and stubs shall be suitably plugged or bulkheaded to the satisfaction of the Engineer prior to testing. All sewers shall be cleaned and pumped out as necessary prior to testing.

Sewer shall be tested for infiltration, unless otherwise ordered by the Engineer. If the Engineer determines that groundwater conditions are not suitable for infiltration testing, sewers shall be tested for leakage. Sewers may be tested for leakage by measuring leakage out of the sewer or by air testing. The length of sewer to be tested shall be subject to prior approval of the Engineer.

The length of house connections, if any, will be included in the total length of sewer under test when computing infiltration or leakage.

All testing equipment and the arrangement of such equipment shall be subject to the prior approval of the Engineer. Sections of sewers under test shall be arranged to prevent the internal pressure on any joint from exceeding 10 psi.

Refer to Section 11 - PVC Pipe Gravity for specific requirements for infiltration and leakage testing for PVC gravity pipe.

W-18.03 Infiltration Test of Sewers

Infiltration tests shall be performed when the groundwater level is a minimum of 2 feet above the crown of the sewer at the highest point in the test section. No such tests shall be started until the infiltration conditions are established in the work to be tested. The Contractor shall provide suitable observation wells along the line of the work or other approved means to determine the groundwater

level.

Infiltration tests will be made by measuring the infiltrated flow of water over a measuring weir set up in the invert of the sewer a distance, as approved by the Engineer, from a temporary bulkhead or other limiting point of infiltration. Testing shall be for a minimum period of 4 hours. The quantity of infiltration for any section of the sewer shall not exceed 50 gallons/mile/day/inch of pipe diameter.

W-18.04 Leakage Test of Sewers

Leakage tests shall be performed by bulkheading the section of sewer under test at the manhole, at the lower end, and filling the sewer with clear water until the water level is up a minimum of 2 feet above the crown of the sewer or a minimum of 2 feet above the groundwater level, whichever is greater, in the manhole at the highest point in the section. Leakage will be the measured amount of water added to maintain the level in the higher end manhole. Tests shall be carried on a minimum of 4 hours with readings at 30-minute intervals. The quantity of leakage for any section of the sewer shall not exceed the limits specified for infiltration in the subsection headed "Infiltration Test of Sewers."

W-18.05 Air Leakage Test of Sewers

Air pressure leakage tests shall be limited to sewers 30 inches in diameter and smaller. The maximum allowable air leakage is based on prewetted pipe walls. The contractor may, therefore, fill the pipe with clear water and then empty the pipe prior to air testing. When pipe walls are prewetted, air leakage tests shall be completed within 24 hours after filling the sewer section to be tested.

Air pressure tests shall be made by placing the sewer under 3.0 psig air pressure and measuring the volume of air required to maintain this pressure. The rate of air leakage shall be determined when the system reaches an equilibrium state and air flow shall be read by means of an approved rotameter.

The maximum rate of air loss shall be 0.003 cfm per square foot of interior pipe surface, and the maximum air flow shall not exceed 2.0 cfm when the total pressure on the sewer is maintained at 3.0 psig. When the groundwater level is above the invert of the sewer, but below a level adequate for infiltration testing, the maximum air loss shall be reduced 6 percent for each foot of groundwater above the sewer invert.

Air testing equipment shall be arranged so that compressors, valving, gauges, and other test devices are located at the ground surface. Air testing equipment shall have an approved air relief arrangement to prevent the sewer from being pressurized to greater than 10.0 psig.

W-18.06 Leakage Tests of Force Mains

Force mains shall be tested as a whole or in sections valved or bulkheaded at the ends. The mains shall be tested under an average hydrostatic pressure of not less than 100 pounds per square inch, unless otherwise indicated in the Specific Provisions. The pressure shall be applied to the pipeline through a tap in the pipe by means of a hand pump or other method and shall be maintained for a minimum of 2 hours. Air shall not be used for testing force mains.

The leakage for all force mains, as determined by the above test, shall not exceed the allowable leakage for iron water mains as given by the following formula in Section 4.2.2. of AWWA Specification C605-05:

$$L = \frac{SD\sqrt{P}}{148,000}$$

in which L is the allowable leakage, in gallons per hour, S is the length of force main tested in feet, D is the nominal diameter of the pipe in inches, and P is the average test pressure in psi gauge.

During the test, each valve shall be operated through several complete cycles of closing and opening. In addition, each valve, when in the closed position, shall have the test pressure applied to one end of the valve only. Each end of the valve shall be tested in this manner. There shall be no visible leakage through the valves, and the valves shall not show any evidence of structural distress.

All harnessed sections of the buried force main shall be completely backfilled before such sections are tested.

W-18.07 Repairing Leaks

When infiltration or leakage occurs in excess of the specified amount, defective manholes, pipe, pipe joints, or other appurtenances shall be located and repaired at the expense of the Contractor. If the defective portions cannot be located, the Contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a sewer or force main within the allowable infiltration or leakage limits upon such retesting as necessary and directed by the Engineer.

* * *

SECTION 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 pump noise.

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.

All bypass pumping systems shall be in accordance with SP-64 Bypass Pumping and specification section W-20 Maintaining Existing Sanitary Sewer in Operation.

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.

W-20.05 Cleanup

When the repair or reconstruction has been completed, all temporary connections and bulkheads shall be removed. Sewers shall be cleaned of all settled solids.

* * *

SECTION 24 - PVC PIPE - FORCE MAIN

W-24.01 General

All pipe and fittings, 4"-48" nominal diameter, shall be solid wall polyvinyl chloride (PVC) pipe manufactured to standards as outlined in the following sections.

Only one pipe manufacturer will be allowed for the entire project.

W-24.02 Pipe standards

For PVC force mains, 4" through 12", the pipe shall be AWWA C900, DR-18 (class 150). For PVC force mains 14" through 48", the pipe shall conform to AWWA C905, DR-25. The outside diameter dimensions shall be identical to ductile iron pipe dimensions. The pipe shall have integral bell push on type joints conforming to ASTM D3139. Bell ends shall be equipped with elastomeric gaskets meeting the requirements of ASTM F477. The color shall be green and the nominal laying length per pipe section shall be 20 ft.

W-24.03 Pre-Installation Tests, Reports, Markings and Submittals

All pipe and fittings shall be marked per Section 2.6 "Marking Requirements" of AWWA C900.

PRIOR TO SHIPMENT of the pipe and fittings to the project site, the Contractor shall submit to the Engineer test reports and certifications as described below, duly certified by the manufacturer's testing facility or an independent certified testing laboratory demonstrating full compliance with AWWA C900 or C905. Certification from the supplier is not acceptable.

An original, plus four (4) copies of the following, shall be submitted to the Engineer.

1. The name, address, and phone number of the pipe and fittings manufacturer and the location of the plant at which they will be manufactured.
2. **CERTIFICATION AND CERTIFIED TEST REPORTS** that each **LOT** of pipe and fittings has been manufactured, sampled, and tested per AWWA C900 or C-905. The City shall be provided in writing with the means to cross-reference the markings with the certification and test reports (i.e. date of manufacturer, lot number and shift number etc.). If this information is marked on the pipe in a code, the markings shall be decoded in writing.

W-24.04 Bedding Requirements

Unless otherwise indicated on the Plans, the PVCP force main shall be installed with Class "C" bedding as shown on the plans. If suitable fill material is not excavated at the project site, it shall be imported. Compaction requirements are described in subsection W-24.12 "Bedding Placement for Pipelines". In no cases shall a concrete cradle be used. In the event the Contractor opts to install crushed stone, it shall be **NO GREATER THAN A #57 STONE**.

W-24.05 Fittings

Fittings shall be ductile iron. All ductile iron fittings shall meet the requirements of AWWA C110 or AWWA C153 and have a minimum thickness of Class 53 or as specified, whichever is larger.

W-24.06 Harnessing

Joint restraint devices for all pipes and fittings shall meet requirements as specified under the "RESTRAINING DEVICES" specification. Thrust blocks shall not be allowed.

All wedge devices assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid Xylan fluoropolymer coating with heat cure to follow each coat.

All casting bodies shall be surface pretreated with a phosphate wash, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact and UV resistance.

The coating system shall be Mega-Bond as manufactured by EBAA Iron, Inc., Eastland, Texas, or approved equal.

W-24.07 Marking and Locating

Two strands of #12 gauge green insulated copper tracing wires shall be attached to the pipe with duct tape at regular intervals in the 10 and 2 o' clock position. The wires shall be looped around each bell. Wire insulation must be suitable for buried service such as HDPE or HMWPE. Nylon insulation is not acceptable. Wires must be spliced together with wire connectors suitable for buried service such as DBR Kit by 3M, Snakebite by Copperhead Industries or equal. Twisting wires together and sealing with electrical tape is not acceptable. No payment will be made for pipe that does not pass a continuity test through the wires after installation. See standard details for additional requirements.

The locating wire shall terminate at the top of each valve box, air release valve box and manhole and must be capable of extending 24" above the top of the box (or manhole) in such a manner so as not to interfere with the valve operation.

W-24.08 Installation

Installation of PVCP force mains shall comply with the requirements of AWWA Standard C605 "Underground Installation Of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings For Water".

Pipe bending shall not be allowed.

Joint deflections up to a maximum of 1 degree will be permitted at integral bell and spigot joints. Deflections larger than 3 degrees may be accomplished with factory molded or fabricated standard angle fittings; or, a standard deflection shall be accomplished with a factory fabricated fitting of the proper angle. Refer to Section W-24.05.

Air release valves shall use service saddles to attach the corporation stop connection to the

PVC pipe. The service saddle body shall be sized exactly to the outside diameter of the pipe, with double straps anchored with a minimum of a four bolt pattern. The service saddle body shall be ductile iron, the sealing gasket shall be BUNA-N rubber and the straps shall be corrosion resistant alloy steel.

W-24.09 Testing

Testing of PVCP force mains shall comply with the requirements of AWWA Standard C605 "Underground Installation Of Polyvinyl Chloride (PVC) Pressure Pipe And Fittings For Water" Section 7 (less references to disinfecting). The hydrostatic and leakage testing may be performed simultaneously. The average hydrostatic test pressure shall be 100 psi.

Air pressure testing of installed pressure pipe is expressly prohibited due to the catastrophic nature of failure should failure occur.

W-24.10 Storage of PVC Pipe

Pipe shall be stored at the job site in unit packages provided by the manufacturer. Caution shall be exercised to avoid compression, damage, or deformation to bell ends of the pipe. When unit packages of PVC pipe are stacked, the Contractor ensure that the weight of upper units does not cause deformation to pipe in lower units.

PVC pipe unit packages shall be supported by racks or dunnage to prevent damage to the bottom during storage. Supports shall be spaced to prevent pipe bending.

PVC pipe shall not be stored close to heat sources or hot objects such as heaters, boilers, steam line, engine exhaust, etc.

When unit packages of PVC pipe are stacked, ensure that the height of the stack does not result in instability which could cause stack collapse, pipe damage, bodily injury, and property damage.

The interior as well as all sealing surfaces of pipe, fittings, and other accessories shall be kept free from dirt and foreign matter.

Gaskets shall be protected from excessive exposure to heat, direct sunlight, ozone, oil and grease.

W-24.11 Handling of PVC Pipe - Standard Procedures

When using fork lifts or other handling equipment, prevent damage to PVC pipe.

When handling PVC pipe, avoid severe impact blows, abrasion damage and gouging or cutting by metal surfaces or rocks. Avoid stressing bell joints and damage of bevel ends.

Pipe shall be lowered, not dropped, from trucks and into trenches.

In preparation for pipe installation, placement (stringing) of pipe shall be as close to the trench as practical and on the opposite side from excavated earth. Bell ends shall point in the direction of

work progress.

The Engineer may reject any pipe that shows visible signs of damage resulting from poor storage and handling practices.

W-24.12 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 dry density as determined by AASHTO Des: T-180. No stone larger than 4 inches in diameter shall be placed closer than two feet to any point on any pipe.

W-24.13 Trench Backfill

Trench backfilling work shall be done in a manner to prevent dropping of material directly on top of any conduit or pipe from a vertical distance greater than 5 feet. 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-24.14 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-24.15 Inspection and Testing of Backfilling

All backfill shall be subject to test by the Engineer.

* * *

SECTION 26 - FILLING OF EXISTING SANITARY OR STORM SEWER SYSTEM

W-26.01 General

All void spaces in sewers, manholes, and structures designated to be filled shall be completely filled and closed. The Contractor shall submit to the Engineer for approval a complete description of the equipment, methods, and materials proposed to be employed in demolishing and filling sewers and appurtenances. The Contractor shall be solely responsible for the protection of all utilities, structures and trees, and for the safety of his workmen and the public during the course of the work. All damage to existing utilities, structures, and trees caused by the Contractor's operations shall be promptly repaired by the Contractor to the satisfaction of the Engineer. If, in the opinion of the Engineer, the equipment, methods, and materials proposed by the Contractor may result in damage to nearby structures and utilities or may not assure complete filling of all voids in the sewer and appurtenances to be filled, the Contractor shall alter the equipment, methods, and materials to the satisfaction of the Engineer.

W-26.02 Filling Existing Sewers

Where existing sewers and appurtenances are designated to be filled, the Contractor shall completely fill all sewers, manholes, and other structures with concrete. The concrete shall have a minimum 28-day compressive strength of 500 psi. Fly ash and admixtures, including water reducing agents, plasticizers, and air-entraining agents will be permitted in the mix design for the concrete. No sand will be permitted in the mix design. The concrete mix shall be designed to facilitate flow for long distances by pumping (only) with minimum separation of materials.

Before beginning the grouting operation, the Contractor shall pump clean water through each run of pipe to ensure that there are no obstructions and that the intake/discharge/vent tube system is functional. Prior to and during filling of existing sewers with concrete, the Contractor shall pump or drain water from the storm sewers being filled to other storm sewers, and shall pump or drain water and sewage from the sanitary sewers being filled to other sanitary sewers, as directed by the Engineer to prevent dilution of the fill concrete. Sediment in existing sewers may remain in place.

The Contractor shall fill the sewers with concrete by pumping (only) through vertical pipes passing through bulkheads, all installed by the Contractor and penetrating the pipe to be filled. All intake, discharge, and intermediate vent pipes shall be, at minimum, 4 inches in diameter and installed at regular intervals close enough to ensure complete filling. Filling shall be accomplished in stages as directed by the Engineer. While filling is in progress through one manhole or fill-pipe, the Engineer will observe the level of concrete in the adjacent manhole(s) or pipe(s). If, in the opinion of the Engineer, complete filling of all voids in the sewers and appurtenances is not assured, the Contractor shall install additional fill-pipes or alter his methods of filling, or both, as directed by the Engineer. If, in the opinion of the Engineer, complete filling is still not assured, the Contractor shall excavate and open the top of the pipe at regular intervals as directed by the Engineer to confirm that the entire run is completely filled.

Manhole frames and covers and all other castings and appurtenances shall be removed and conveyed by the Contractor to his own place of disposal unless otherwise directed by the Engineer. The top 2 feet of the manholes shall be removed. Where the manholes are located in grassed areas, 2 feet of top soil shall be placed and the area sodded. Where the manholes are located in the street, the

top 2 feet shall be filled with base material or asphalt. All fill-pipes shall be withdrawn and the holes completely filled with concrete. The surface at each manhole and fill-pipe location shall be restored to match the adjacent undisturbed surface to the satisfaction of the Engineer.

Prior to commencing any filling operations, the Contractor shall submit his proposed plan for filling and the proposed concrete mix design for approval by the Engineer. The plan shall show the proposed locations of all fill pipes as well as the location of all existing manholes and structures along the sewer. The plan and mix design shall be revised by the Contractor as considered necessary by the Engineer.

* * *

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, roofing materials 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 (unless otherwise specified) 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 20 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.

Except where otherwise directed by the Engineer, gaskets for flanged joints shall be of the full-face type, meeting the requirements of ANSI B16.21. Gaskets shall be Nitrile rubber, also known as Buna-N and NBR, as made by the American Seal & Packing Company, Garlock of EnPro Industries, U.S. Rubber Supply Company, or equal.

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

Hangers and supports material shall be stainless steel.

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 all valves to be used on City maintained force mains, City owned pump stations, and the Howard F. Curren Advanced Wastewater Treatment Plant. Requirements of this section apply to all valves unless exceptions are shown or stated on the plans or specific provisions.

Plug valves for buried applications shall be provided with mechanical joints. Plug valves for above-ground applications shall be provided with flanged connections.

All force main valves shall be plug valves meeting the requirements of the sub-section "Eccentric Plug Valves."

Valves 2 inches in diameter and smaller shall be all brass or bronze, except the handwheel, and shall have screwed ends. Valves 2-1/2 inches in diameter and larger shall be iron body, bronze mounted with flanged ends, except that in the smaller sizes, valves may be all bronze at the Contractor's option.

All gate, globe, and angle valves shall have rising stems, unless otherwise specified, and shall open when the nut or handwheel is turned counterclockwise. Each handwheel shall be marked with an arrow and the word "Open." Each nut shall be marked with an arrow and shall not be greater than 24 inches in depth below finished grade.

All references to "stainless steel" or "SS" shall mean 316 stainless steel.

All valves of the same type shall be from a single manufacturer. Parts of valves of the same type and size shall be interchangeable.

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 Submittals

The Contractor shall prepare and submit for approval a complete detail drawing of all valves in accordance with the requirements of the Specific Provisions. At minimum the submittal shall show all proposed material types to be used as well as proposed interior and exterior coating manufacturer, coating type and proposed minimum dry film thickness.

W-32.03 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-32.04 Gate Valves

Except as otherwise specified, gate valves shall meet the requirements of Fed. Spec. WW-V-54, Class A, 125 pounds.

Gate valves shall have standard stuffing box seals. Bonnet bolts, studs, and nuts shall be cadmium plated. Wedging devices shall be bronze to iron or bronze to bronze as specified. Glands shall be bronze bushed; gland bolts and nuts shall be bronze.

Gate valves 2-1/2-inch diameter and larger shall be of the double disc type. Gate valves 2-inch diameter and smaller may be of the double disc or solid wedge type.

Valves with operating nuts or wheels 7 feet or more above the floor shall be provided with chains and chain wheels.

W-32.05 Globe and Angle Valves

Except as otherwise specified herein, globe and angle valves shall meet the requirements of Fed. Spec. WW-V-51, Class A, 125 pounds.

W-32.06 Hose Valves

Hose valves shall be globe or angle valves with rising stems, and rubber composition discs for cold water pressures up to 200 psi, nonshock.

Hose valves shall be all bronze or brass, except the handwheel which shall be of malleable iron. Hose threads shall conform to ANSI B2.4.

W-32.07 Check Valves

Check valves, unless otherwise specified, shall be APCO Series 100 of the horizontal, swing type designed to allow full diameter passage and to operate with a minimum loss of pressure. Check valves shall be equipped with hold-open devices. A Letter of Standardization has been executed for this valve. The letter states that no other valve shall be considered an "or equal" in accordance with the City's standardization program. The "or equal" clause applies to all other equipment, unless specifically excluded by a Single Source Certificate or Letter of Standardization.

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.

The exterior of the check valve shall be factory coated with an approved interior and exterior corrosion resistance coating. The exterior of the check valve shall receive a field coat as indicated for “Steel Pipe and Fittings” in the Workmanship & Materials Section titled “Painting”.

W-32.08 Pump-Check Eccentric Plug Valve

Pump-check valves, unless otherwise specified, shall meet the requirements of the sub-section for “Eccentric Plug Valves”.

The valve shall be equipped with a G-Series rotary cylinder pneumatic actuator that is properly sized for the existing compressed air system within the pump station.

Plug valves shall be Dezurik PEF (100% Port) eccentric plug valve or approved equal.

W-32.09 Eccentric Plug Valves

Plug valves shall be of the eccentric valve design and shall meet or exceed the requirements of AWWA C517 and shall be designed for 175 PSI 3’-12” and 150 PSI 14”-36”. Manufacturer’s Name shall be cast in body and Valve shall be serialized for future parts identification. Port area shall be 100% of standard pipe area. The Plug shall be Rectangular with associated Rectangular Port and shall provide dead tight shutoff when seated in the closed position. Body material shall be Cast Iron ASTM A126 Class B, Seats shall be 1/8” thick 95% Nickel and 1/2” wide for proper plug seating. Plug shall be Ductile Iron ASTM A536 and Chloroprene Faced. Bearings shall be sintered, oil impregnated permanently lubricated type 316 stainless steel, include upper and lower grit excluders to prevent grit and foreign solids from entering the bearings. Shaft seals shall be multiple V-ring type and shall be externally adjustable via an air gap and re-packable under pressure without removing the actuator or bonnet from the valve. Valves shall have interior and exterior epoxy.

Plug valves shall be nut operated (1/4 turn) 4” to 8” and gear operated 10” and larger. Both nut and gear operated valves shall have a 2-inch square nut for operation. On pump stations where the valve is 7 feet or more above the floor level, a chain and wheel shall be provided for operation.

Plug valves shall be Dezurik PEF (100% Port) eccentric plug valve. A Letter of Standardization has been executed for this valve. The letter states that no other valve shall be considered an “or equal” in accordance with the City’s standardization program. The “or equal” clause applies to all other equipment, unless specifically excluded by a Single Source Certificate or Letter of Standardization.

W-32.10 Knife Gate Valves

Valves shall be bonnetless wafer knife gate type with cast single-piece body construction. Lugged ends shall have threaded holes in accordance with ANSI B16.1 125/150 pound standards. Working pressure rating shall be 150 psi in sizes 2”-24”. Valve body and gate shall be stainless steel type 316 or as specified. Stem shall be type 304 stainless steel. Valve shall have a round port equal to 100% of the connecting pipe. Valves shall be chloroprene resilient seated or as specified.

The body design shall have no pockets or grooves in the flow port where media can settle and adversely affect closure. The gate shall be polished to provide low thrust requirements and long packing life. The leading edge of the gate shall be beveled to assist in closure. The stem shall be outside of the body and will not contact the flowing media. Valves shall have multi-layer square packing with adjustable packing gland bolting.

All valve bodies shall be tested with water at 150% of rated pressure with no visible leakage. Assembled valves shall be tested for seat leakage with water at 40 psi applied to the back of the gate (pressure in the normal flow direction) and allowable leakage shall be as per MSS SP-81 specifications.

Valves shall be provided with a manually operated direct-mounted handwheel as specified or shown on the construction drawings. Floor stands and extensions shall be provided if specified. Valve superstructures shall be designed to allow easy field interchangeability between manual and pneumatic actuators. New superstructures shall not be required for conversion between manual and pneumatic operators.

Metal surfaces other than stainless steel shall receive a field coat as indicated for “Steel Pipe and Fittings” in the Workmanship & Materials Section titled “Painting”.

Valves shall be model GKU by DeZURIK, Inc, or approved equal.

W-32.11 Multiport Valves

Three-way and four-way valves, unless otherwise specified, shall meet the requirements of the subsection for eccentric plug valves.

W-32.12 Solenoid Valves

Solenoid valves, unless otherwise shown or specified, shall be normally closed packless type with full area ports. The body and bonnet shall be forged brass and the solenoid core shall be stainless steel. The diaphragm shall be of synthetic rubber assuring long service life. The coils shall be designed for 115-volt, 60-hertz operation and shall be embedded in molded plastic in NEMA Type I general purpose enclosure.

W-32.13 Ball Valves for CPVC Piping

Manually operated ball valves for CPVC piping shall be CPVC ball valves having renewable Teflon ball seats and EPDM seals. Ball valves shall block in both seating directions, leaving full pressure on the opposite end of the valve. The CPVC ball valves shall be rated at not less than 150 psi working pressure at 75 degrees F, self-lubricating, and shall have socket end connectors. The ball valves shall be of true union design to allow for inspection or removal. CPVC ball valves shall be as manufactured by Hayward Industrial Products, Inc., or equal.

W-32.14 Ball Check Valves for CPVC Piping

Ball check valves for CPVC piping shall be constructed of solid CPVC and shall have a CPVC ball. The check valve shall have EPDM O-rings and shall be capable of operating either horizontally or vertically. The check valve shall have a full flow design that provides a free open area that is equivalent to the connecting pipe size. The check valves shall have socket end connectors and shall be of the true union design to allow for inspection and removal of the valve. Ball valves for CPVC piping shall be as manufactured by Hayward Industrial Products, or equal.

W-32.15 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-32.16 Painting and Coating

Plug valves shall receive a factory interior and exterior coating of Tnemec Series 141 (4 mils thick).

All other valves shall receive a factory interior and exterior coating of an approved system.

Metal surfaces other than stainless steel shall receive a field coat as indicated for "Machinery and Equipment" in the Workmanship & Materials Section titled "Painting".

Chain wheels shall be coated by galvanizing or electroplating with zinc or cadmium. The 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.

* * *

SECTION 33 - LEAKAGE TESTS - PUMPING STATIONS

W-33.01 General

All pipelines and structures required to be watertight shall be tested for leakage by the Contractor under the direction of the Engineer. Air and gas lines shall be tested with compressed air and all other pipelines shall be tested with water under the pressures specified herein.

All tests shall be conducted in a manner to minimize as much as possible any interference with the Contractor's work or progress.

The Contractor shall notify the Engineer when the work is ready for testing, and tests shall be made as soon thereafter as possible. Personnel for reading meters, gauges, or other measuring devices, all other labor, equipment, air, water, and materials, including meters, gauges, smoke producers, blower, fuel, bulkheads, and accessory equipment, shall be furnished by the Contractor.

W-33.02 Pressure Tests

Pressure tests of pipelines shall be made by maintaining the fluid in the pipe at the specified pressure for a period of 30 minutes. The pipelines shall show no leakage.

Test pressures for the various pipelines shall be as follows:

<u>Type of Pipeline</u>	<u>Test Pressure psi</u>
Sewage (Pump Suctions)	5
Sewage (Pressure) - Pump Discharge	100
Water	125
Sump pump discharge	25
Compressed air	200
Drains	5

W-33.03 Tests of Structures

Leakage tests of wet wells and similar purpose structures shall be made before backfilling by filling the structure with water to the overflow height and observing the water surface level for the following 24 hours. Inspection for leakage will be made of the exterior surface of the structure, especially in the area around the construction joints.

Leakage will be accepted as within the allowable limits for structures from which there are no visible leaks and in which the water surface drops not more than 1/2 inch during the 24 hour test.

If visible leaks appear, the structure shall be repaired by removing and replacing the leakage portions of the structure, waterproofing the inside, or by other methods approved by the Engineer.

Water for the initial filling of the structure will be supplied by the City. Water for subsequent fillings, if required, shall be at the expense of the Contractor.

* * *

SECTION 36 - PAINTING

W-36.01 General

Painting includes furnishing all labor, materials, and services to paint all structures and equipment specified and required to complete the work, including, but not limited to, the following: preparation of surfaces; field painting of existing and proposed structures, piping, conduit, ductwork and equipment as specified, and the marking of existing piping and electrical conduit. The work shall include furnishing samples of paints and color charts. The Contractor shall employ a NACE Level III Coating Inspector as noted below.

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 or Project Representative. 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. 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. Contractor is responsible for 100% containment of blasting materials and debris. The Contractor shall provide protection for all motors, compressors, belts, gauges, ports, equipment signage, etc. These items shall be kept protected at all times during the blasting and painting activities detailed in this specification.

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 pressure cleaned (5000 psi) in accordance with Steel Structures Painting Council standards SSPC - SP1 Solvent Cleaning: Removal of all detrimental foreign matter such as oil, 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.

The topcoat shall be free of runs, drips, voids, spatters, or any other defects. The contractor shall use a dry film thickness gauge to ensure that the coating is being applied to the manufacturer's specification.

Concrete and Wood Surfaces:

Surface preparation of all exterior concrete and wood surfaces shall be pressure washed to remove cobwebs, dirt, dust, and other surface contaminations. Mildew shall be treated with a 22% chlorine solution or otherwise by mixing equal parts solution bleach and water to the affected area. Loose paint and other defects shall be removed by hand; brushing, sanding, chipping or other hand tools or by power; brushes, impact tools, grinders, sanders or other power tools or by any combination thereof. Painted edges shall be sanded smooth to match adjacent bare surfaces.

All interior concrete and wood surfaces including ceilings, walls, and floors shall be cleaned similar to SSPC - SP1 Solvent Cleaning standards. Loose paint and other defects shall be removed by hand; brushing, sanding, scraping, chipping or other hand tools or by power; brushes, impact tools, grinders, sanders or other power tools or by any combination thereof. Painted edges shall be sanded smooth to match adjacent bare surfaces.

Priming shall be performed with Porter Acri-Pro 100, 100% Acrylic, or equal. First and second coats shall be performed with Porter Acri-Shield, 100% Acrylic, or equal. Concrete, concrete masonry, and wood shall be thoroughly dry prior to painting.”

W-36.04 Coatings

All paints and similar materials shall be mixed in galvanized iron pans or pails or other approved containers of adequate capacity. All paint shall be stirred thoroughly before being taken from the containers, shall be kept stirred while using, and all ready-mixed paint shall be applied exactly as received from the manufacturer without addition of any kind of drier or thinner, except as specified or as permitted or directed by the Engineer. Successive coats of paint shall be tinted to make various coats easily distinguishable. Undercoats of paint shall be tinted to the approximate shade of the final coat of paint. The paint shall be a minimum temperature of 60 degrees F before application.

Only skilled painters shall be used on the work, and specialists shall be employed where required. Paint shall be applied by brush, roller, or sprayer in accordance with the manufacturer's

recommendation. Finished surfaces shall not show brush marks or other irregularities. Top and bottom edges of doors shall be painted. Undercoats on hollow metal work shall be thoroughly and uniformly sanded with No. 00 sandpaper or equal abrasive to remove all surface defects and provide a smooth, even surface.

Painting shall be a continuous and orderly operation to facilitate adequate inspection. All paint application methods shall be in accordance with the instructions of the paint manufacturer and as approved by the Engineer. Access panels, pipes, pipe covering, ducts, and other building appurtenances built into or adjoining walls to be painted shall be painted the same color as adjacent walls, unless otherwise directed by the Engineer. Hardware and accessories, fixtures, and similar items placed prior to painting shall be removed or protected during painting and replaced on completion of painting. All wall surfaces to be concealed by equipment shall be painted before installation of the equipment.

Areas under and adjacent to painted work shall be fully protected at all times and dripped or splattered paint shall be promptly removed. Painting shall not be done when the temperature is below 60 degrees F, or in dust-laden air, or until moisture on the surface has completely disappeared. If necessary, sufficient heating and ventilation shall be provided to keep the atmosphere and all surfaces to be painted dry and warm until each coat of paint has hardened. Any painting found defective shall be removed and repainted or touched up as directed by the Engineer.

Coatings must be allowed to cure before being recoated or placed into service. Drying time requirements recommended by the manufacturer should be followed exactly.

Coverage shall be complete. When color on undercoats shows through the final coat of paint, the work shall be covered by additional coats until the paint is of uniform color and appearance and coverage is complete, at no additional cost.

Rooms or areas being painted shall be supplied with sufficient temporary ventilation during painting operations to keep the atmosphere safe from harmful or dangerous fumes and harmful dust levels for personnel.

All application tools and equipment shall be in good working order and suitable for proper applications. It shall be the Contractor's responsibility to ensure that no paint mist or spatter falls or blows to other objects, vehicles, equipment, buildings, etc.

Coating Schedule:

All painting shall be in accordance with the following schedule. The number of coats shall not be less than the number shown on the schedule.

COATING SCHEDULE (NEW)					
Surfaces	SHOP COAT	Primer	Coats		
			1ST	2ND	3RD
Aluminum	NA	B	E	NA	NA
Electrical Conduit	NA	B	E	NA	NA
Steel Pipe, Valves, and Fittings	C	Shop	C	E	NA
Galvanized Steel	NA	B	E	NA	NA
Ductile Iron Pipe, Valves, and Fittings*	A	Shop	C	E	NA
Miscellaneous Steel and Ironwork	C	Shop	C	E	NA
Machinery, Interior, and Nonsubmerged	Shop Standard	I	E	NA	NA

Exterior Concrete or Masonry	NA	H (CMU)	F	G	NA
------------------------------	----	------------	---	---	----

COATING SCHEDULE (PREVIOUSLY PAINTED)					
Surfaces	Spot Coat Bare Surface	Full Prime Coat	Coats		
			2nd		
Aluminum	I	I	E		
Electrical Conduit	I	I	E		
Steel Pipe, Valves, and Fittings	I	I	E		
Galvanized Steel	I	I	E		
Ductile Iron Pipe, Valves, and Fittings	I	I	E		
Miscellaneous Steel and Ironwork	I	I	E		
Machinery, Interior, and Nonsubmerged	I	I	E		
Exterior Concrete or Masonry	H (CMU) or F (Concrete)	F	G		

The designations in the following list are given solely for the purpose of indicating the type and quality of materials desired. Approved equivalent material of other manufacturers may be substituted. All coats of paint for any particular surface shall be from the same manufacturer.

ALPHABETICAL DESIGNATIONS OF PRODUCTS		
Symbol	Product Name and Number	Minimum Dry Film Thickness Mils per Coat
A	Tnemec N140 Pota-Pox II	3.0-5.0
B	Tnemec N69 Polyamidoamine Epoxy	2.5-3.5
C	Tnemec N69 Polyamidoamine Epoxy	4.0-6.0
D	Tnemec Series 446 Perma-Shield	5.0 - 7.0
E	(Above Grade) Tnemec 1074U Endurashield** (Below Grade) Tnemec Series 446 Perma-Shield	3.0-5.0 5.0 – 7.0
F	Porter Acri-Pro 100, 100% Acrylic	1.2
G	Porter Acri-Shield, 100% Acrylic	1.4
H	Block Filler	85 -100 SF / Gal
I	Tnemec 135 Chembuild	3.0-5.0

*** For all above ground ductile iron piping, valves, and fittings, Tnemec 1074U Endurashield shall be black.

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 38 - SEWAGE PUMPING EQUIPMENT

W-38.01 General

Sewage pumping equipment shall include the installing of totally submersible, electrically operated sewage pumps complete with all accessories and appurtenances necessary for a complete installation in the pumping station.

Each pump shall be an ITT Flygt, Pump, and shall comply with the drawings and specifications for this project. A single source certificate of conditions and circumstances was executed for this pump. The certificate states that no other pump shall be considered an "or equal" for this project in accordance with the City's standardization program. The "or equal" clause applies to all other equipment in this project, unless specifically excluded by a single source certificate or letter of standardization.

Each pump shall have a substantial guide bracket to permit vertical sliding along not less than two unthreaded stainless steel guide rails from an automatic pump discharge connection at the bottom of the wet pit to the wet pit access cover for inspection, maintenance, and removal of the pump without requiring personnel to enter the wet pit. The pump shall be easily removable from the guide rails and shall require no bolts, nuts, or other fasteners to be disconnected. The guide brackets shall be of stainless steel and shall be an integral part of the pumps. The guide rails shall be Type 304, Schedule 40 stainless steel pipe and shall be connected to the automatic pump discharge connection at the bottom and supported at the top by substantial stainless steel brackets bolted to the concrete sides of the wet pit access opening. The automatic pump discharge connection shall be cast-iron, flanged by plain-end, 90 degree vertical bend with an integral cast-iron support. The support shall be bolted to the floor with not less than four, 3/4-inch diameter stainless steel anchor bolts cast into the concrete. The pump volute discharge shall have a machined flange, which when the pump is lowered into pumping position will automatically and firmly mate with the plain-end of the discharge connection without the need of adjustment, fasteners, clamps, or similar devices. No motion other than vertical shall be required to seat the mating flange of the pump volute to the discharge connection. Sealing of the discharge interface shall be accomplished by only metal contact and the use of a diaphragm, O-ring, or other device will not be permitted. The pump, with its appurtenances, shall be capable of continuous submergence under water without loss of watertight integrity to a depth of 65 feet. No portion of the pump shall bear directly on the floor of the wet pit. Each pump shall be fitted with a tall stainless steel lifting handle and a stainless steel welded link chain of adequate length to permit the raising and lowering of the pump for inspection and removal.

W-38.02 Pump Characteristics

Each Flygt pumping unit shall be designed for operating under the following conditions:

109th Pump Station:

<u>Rating Data</u>	<u>Pump No.</u>
Number of Units	3
Rate of flow at rating point, gpm	900
Total pumping head at rating point, ft.	61
Minimum pump efficiency at rated conditions, %	73
Range of flow with satisfactory operation and corresponding approximate heads	2200 gpm @ 23 ft. 300 gpm @ 80 ft.
Service and characteristics of electrical power	460 volt 3 phase 60 hertz 4 wire

Motor:

Horsepower (minimum) hp - 3 phase	25
Speed, rpm	1750

W-38.03 Construction

The stator casing, oil casing, sliding bracket, volute, and impeller of each pump shall be of hard, close grained gray cast iron. All castings must be blasted before coating. All wet surfaces are to be coated with two-pack oxyrane ester Duasolid 50. The total layer thickness should be at least 120 microns. Zink dust primer shall not be used. All external bolts and nuts shall be of stainless steel.

The impeller of each pump shall be of non-clog design capable of passing a 3-inch spherical solid, fibrous material, and heavy sludge and shall be constructed with long throughlet without acute turns. The impeller shall be statically and dynamically balanced. Static and dynamic balancing operations shall not deform or weaken the impeller. The impeller shall be firmly secured to the shaft by a stainless steel key and lock nut in such a way that it cannot unscrew or become loosened due to torque resulting from rotation in either direction.

Each pump shaft shall be of stainless steel conforming to ASTM Des: A 582, Type 416. The shaft shall be accurately machined and polished and of sufficient diameter to carry the maximum load imposed, to assure rigid support of the impeller and to prevent excessive vibration at all operating speeds. The shaft shall be provided with two guide bearings of the ball type of ample size to carry the loads imposed under continuous service without overheating.

Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir having separate, constantly hydro-dynamically lubricated lapped seal faces. The lower seal unit between the pump and oil chamber shall contain one stationary and one positively driven rotating tungsten-carbide ring. The upper seal unit between the oil sump and motor housing shall contain one stationary tungsten-carbide ring and one positively driven rotating carbon ring. Each interface shall be held in contact by its own spring system supplemented by external liquid

pressures. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable. Shaft seals without positively driven rotating members or conventional double mechanical seals with a common single or double spring acting between the upper and lower units, requiring a pressure differential to offset external pressure and effect sealing shall not be considered acceptable nor equal to the dual independent seal system specified. The shaft sealing system shall be capable of operating submerged to depths of or pressures equivalent to 65 feet. No seal damage shall result from operating the pumping unit out of its liquid environment. The seal system shall not rely upon the pumped media for lubrication.

The pump motors shall be housed in an air-filled watertight casing and shall have Class F moisture resistant insulation. The temperature at any point in the windings shall not exceed 155 degrees C at any load which could be imposed by the pump at any point on its curve. The motors shall be 460-volt, 3-phase, 60-hertz, squirrel-cage induction motors. Each motor shall have a minimum full load efficiency of 85 percent and a minimum full load power factor of 80 percent. Each motor shall be U.L., Inc. or Factory Mutual Engineering Corporation listed for installation and operation in a Class I, Division 2, Group C and D hazardous locations. Each motor shall have a facility for winding high temperature alarm. Each motor shall be provided with a leakage sensor to provide an alarm indication prior to liquid reaching the stator coils. The pumps shall not load the motor beyond its nominal (nameplate) rating at any point on the pump curve. Each pump motor shall be furnished with a minimum service factor of 1.15 or the horsepower rating of the motor shall be a minimum of 15 percent greater than the maximum BHP required over the full range of the pump curve. Electrically and mechanically each pumping unit (pump and motor) shall be capable of a minimum of ten (10) starts per hour.

The motor cable entry water seal shall be such that precludes specific target requirements to ensure watertight and submersible seal. Epoxies, silicones, or other secondary sealing systems shall not be required or used. The cable entry junction box and motor shall be separated by a stator lead sealing gland or terminal board which shall isolate the motor interior from foreign materials gaining access through the pump top. The pump motor cable shall be suitable for submersible pump applications, and this shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC specifications for pump motors and shall be adequate size to allow motor voltage conversion without replacing the cable.

All mating surfaces of major parts shall be machined and fitted with nitrile O-rings where watertight sealing is required. Machining and fitting shall be such that sealing is accomplished by automatic compression in two planes and O-ring contact made on four surfaces, without the requirement of specific torque limits to affect this. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered adequate or equal. Tolerances of all parts shall be such that allows replacement of any part without additional machining required to ensure sealing as described above. No secondary sealing compounds, greases, or other devices shall be used.

Each unit shall be provided with an adequately designed cooling system. Thermal radiators integral to the stator housing, cast in one unit, are acceptable. Where water jackets alone or in conjunction with radiators are used, separate circulation shall be provided. Cooling media channels and ports shall be non-clogging by virtue of their dimensions.

W-38.04 Field Tests

After installation of the pumping units, control equipment, and all appurtenances, each pumping unit will be subjected to a field running test of not less than 24 hours duration under actual operating conditions. The field test shall be conducted by the Contractor in the presence of and as directed by the Engineer. The field test shall demonstrate that under all conditions of operation, each unit:

1. Had not been damaged by transportation or installation.
2. Has been properly installed.
3. Has no mechanical defects.
4. Is in proper alignment.
5. Has been properly connected.
6. Is free of overheating of any parts.
7. Is free of all objectionable vibration.
8. Is free of overloading of any parts.

The tests shall also demonstrate that the control systems perform as specified and meet all operating criteria.

Any defects in the equipment or operating controls or failure to meet the requirements of the Specifications shall be promptly corrected by the Contractor.

W-38.05 Service

Authorized service facilities must be available in Florida. The pump supplier will stock at the facility one set of recommended spare parts as described below for the pumps specified in this Contract.

Inspection Plug Washers
Impeller Bolt
Impeller Key
Upper Bearing
Lower Bearing
Upper Mechanical Seal
Lower Mechanical Seal
Wear Rings
Motor Cable
Cable Entry Washer/Grommet
Complete Set of O-rings

W 38-.06 Mix-Flush Valves

The Contractor shall supply pumps with mix-flush valves installed on the volutes. The volute shall have an integral mounting pad on which to mount the mix-flush valve. The

mounting of the valve shall not void the pump manufacturer's warranty. The valve shall be mounted by the valve manufacturer or agent to assure proper installation and operation.

The mix-flush (or flush) valves shall be hydraulically activated and shall not contain any electromechanical components. The mix-flush system shall be intrinsically safe and suitable for pumps used in hazardous locations Class 1, Division 1, Groups C and D. The flush valve shall be fully automatic and shall operate each time the sewage pump cycles into running mode. The length of time for the flushing action shall be adjustable to a period of between 20 and 50 seconds. A means of adjustment shall be provided on the outside of the valve to obtain the desired flushing period.

The mix-flush valve shall be a standard production item of the pump manufacturer and warranted by the pump manufacturer for a period of 15 months from date of substantial completion. The warranty station shall be within 100 miles of the installation and replacement units shall be kept in stock at all times.

Each new pump shall be provided with a volute plug along with the mix-flush valves.

W-38.07 Spare Parts

One complete set of mechanical seals shall be furnished for each different model of pump furnished in this Contract (unless otherwise specified on the Plans).

* * *

SECTION 45 – ELECTRICAL

W-45.01 Scope of Electrical Work

The work in this section consists of furnishing all labor, materials, equipment and transportation, and performing all operations required to support the installation and commissioning of the electrical portion of the proposed 109th Avenue Pump Station Rehabilitation including, but not limited to, the following:

1. Submit working drawings, parts schedules, and cut-sheets to the Engineer.
2. Furnish and install all electrical equipment, controls, and instrumentation as shown on the Plans and described in the Specifications. Refer to Plans for the Scope of Work.

W-45.02 General Requirements

1. Codes

Any conflicts between the Specifications and Drawings or with the regulations of local codes, public utility company, or the National Electrical Code or the National Electrical Safety Code shall be promptly brought to the attention of the Engineer for clarification. All materials and work shall be in accordance with said standards.

2. Contract Documents

The drawings are generally diagrammatic not necessarily showing in detail all of the minor items and it shall not be interpreted to mean that any minor item required may be omitted. The Contractor shall make use of all the data in all of the Contract Documents and shall verify all information at the site, which may influence his proposal. The Contractor shall obtain all necessary shop drawings and shall consult manufacturer's representatives during installation start-up as needed.

3. Tests

The Contractor shall provide all necessary instruments and special apparatus to conduct any test that may be required to ensure that the system is free of all improper grounds and short circuits. These tests shall be conducted in the presence of the Engineer prior to final acceptance.

4. Guarantee

The Contractor shall submit a written guarantee to the City that all electrical work and material provided under this Contract is free from defects for a period of one year after final acceptance of the job. There will be no additional charge to the City to repair or replace any such work, which is found to be defective within the guarantee period.

5. Materials and Equipment

All materials and equipment shall be new and shall bear the manufacturer's name, date of manufacture, trade name, and the UL label. Equipment and materials shall be delivered to the site and stored in original containers, suitably sheltered from the elements, but readily accessible for

inspection.

6. Operation and Maintenance Manuals

See Specific Provisions section of the Specifications.

7. Test Documentation

Test all equipment and document tests.

W-45.03 Execution of Work

All work shall be executed in a neat and workmanlike manner by experienced and capable electricians so as to present a neat installation upon completion.

Electrical work shall be coordinated so as not to interfere with or delay other construction operations.

The ends of all conduits shall be carefully reamed free from burrs after threading and before installation. All cuts shall be made square. All joints shall be made up tight. Care shall be taken to see that all control and power conduits are grounded as required by the NEC and Chapter 5 of the City of Tampa Code, Building and Construction Regulations.

* * *

SECTION 46 - CONTROLS

W-46.01 General

Control components shall comply with the latest ANSI, IEEE, and NEMA standards where applicable.

Maximum control voltage shall be 120 VAC, 60 Hz.

Control devices shall be of industrial grade, heavy-duty design, utilizing modular construction to increase flexibility.

W-46.02 Control Enclosures and Panels

The control enclosures shall be rated NEMA 3, gasketed, and be constructed of minimum 14 gauge, 304 stainless steel. The door shall have a handle with padlock provisions and three-point latch mechanism. The door shall be provided with a positive stop mechanism to prevent it from closing while controls are being serviced. Stiffeners shall be provided on the enclosure and door as necessary to provide rigidity. The closing surfaces shall have rolled lips. The outside of enclosure shall be finished with a durable RAL 9003 white powder coat to reduce solar heat gain. All hardware shall be heavy-duty, stainless steel. A print pocket shall be provided on the inside of the door. The enclosure dimensions shall be as shown or required.

The panel shall be 12 gauge steel and sized to be accommodated by the enclosure. The periphery of the panel shall be formed to provide a 0.75 inch stiffener frame. The panel shall be primed, painted with white enamel and baked, after forming.

The enclosure and panel shall be as manufactured by Quality Metals, Hoffman Engineering, or equal.

Motor Control Panel

The motor control panel shall be as defined in Sections W-46.01 General, W-46.02 Control Enclosures and Panels and shall contain, but not limited to the components listed in the sections W-46.03 thru W-46.10:

W-46.03 Motor Starter

A. Full Voltage Starter

The motor starter shall be 3-pole polyphase, and have a NEMA rated contactor with a minimum Size 1 rating. It shall be designed for full voltage, non-reversing service.

Motor starter contacts shall be silver alloy, double break; and shall be easily replaceable, with standard tools, without removing the starter from the enclosure; or removing the line, load, or control wiring from the starter.

Contactor coil shall be of the encapsulated type; and shall be easily replaceable, with standard tools, without removing the starter from the enclosure, or removing the line or load

wiring from the starter.

The motor starter shall be provided with a Trip Class 20, bimetallic, ambient compensated, overload relay adjustable over a range of 85% to 115% of the nominal heater rating. The current in all 3-poles shall be sensed. The overload relays shall be field convertible from hand reset to automatic reset and vice-versa. When in automatic reset -- after tripping the relay -- the contacts will automatically reclose when the relay has cooled down. A manual “trip-to-test” feature shall be provided to facilitate a quick test of the mechanical and electrical operation of the overload relay. The overload relays shall include a “visible trip indicator” to easily identify a tripped overload block.

The motor starter shall have a 120VAC, 60Hz contactor coil and control circuit.

A minimum of one (1) N.O. holding contact shall be provided. The capability shall exist to install additional contacts in the field.

The motor starter shall be as manufactured by Square D, Cutler-Hammer, General Electric, Allen Bradley, or equal.

B. Reduced Voltage Solid State Starter

See Section W-49 Reduced Voltage Solid State Starter

C. Variable Frequency Drive

See Section W-69 Variable Frequency Drives

W-46.04 Circuit Breakers

Circuit breakers shall be of the molded case, air-break type designed for 600 volt, 60 Hz 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, or equal.

W-46.05 Surge Protection Devices – Three Phase (SPD-1)

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 277/480 VAC 3-phase, 4-wire. The maximum single impulse current shall be 100kA per phase.

1. The SPD shall have a 10-YEAR warranty. Under that warranty, the SPD shall be replaced if it is destroyed by lightning or other impulses.
2. The SPD shall have an LED failure indicator on all three phases.

3. The clamp voltages for the SPD shall be the following:

Line to neutral – 1200 volts
Line to ground – 1200 volts
Neutral to ground – 1200 volts
Line to line – 2000 volts

The Surge Protection Device shall be Advanced Protection Technologies model TE04XDS104X, or equal.

W-46.06 Seal Leak Detector

The seal leak detector shall be compatible with the submersible pump supplied and be Underwriters Laboratories (U.L) listed for use in sewage pumping applications. The Contractor shall coordinate with pump manufacturer to determine specific hardware required for stator temperature and seal-leak detection. The detector shall have the following features:

- 1.) The unit shall employ low voltage, low current, conductivity probe type liquid level detection.
- 2.) 120 VAC, 60 Hz, operating voltage.
- 3.) The alarm output shall be an SPDT 10 amp, 250 VAC relay contact with a minimum 2000 VAC isolation to probe.
- 4.) Probe supply characteristics - sensitivity, 4.7K to 100K OHM, adjustable; voltage, 24 VAC, 60 Hz; current, 2mA maximum.
- 5.) Eight pin octal-type plug (provide matching screw terminal sockets).
- 6.) The unit shall be housed in a high-impact plastic dust cover.

The seal leak detector shall be MINI-CAS for Flygt pumps and Crouzet model PNRU110A or equal for other manufactures.

W-46.07 Panel Mount Fuse Holder and Fuse

Panel mount fuse holders shall be rated for a minimum of 15 amps, 250 VAC. They shall accommodate 0.25 by 1.25-inch glass fuses and have a bayonet type knob. Terminations shall be by 0.25-inch Quick-Connect. Fuse holders shall be Bussman HKP, or equal.

Fuses shall be 0.25 by 1.25-inch slow blow, dual element, glass body with ratings as shown or required. Fuses shall be Bussman MDL series, or equal.

W-46.08 Power Phase Monitors

Phase Monitors shall be provided and installed as shown on the Drawings and specified herein. The unit shall have the following features:

- 1.) Adjustable in voltage
- 2.) input— 480 volt, 3-phase, 60Hz, 4-wire, utility service
- 3.) adjustable voltage range control
- 4.) SPDT relay operation and LED indication shall be triggered by phase loss, low voltage, power failure, or improper phase sequence.

- 5.) LED indication shall be on when voltage is normal— off with fault
- 6.) relay shall operate if fault lasts more than 2.0 seconds.
- 7.) relay shall release after voltage is normal for 5.0 seconds
- 8.) relay contact rating— 10 Amps
- 9.) mounting— 8-pin plug-in— provide socket for DIN rail

Phase Monitor PM2, PM3, and PM4 shall be model SUA-440-ASA as manufactured by ATC Diversified Electronics, or equal.

W-46.09 Phase Monitor Fuse Holders and Fuses

The Fuse Holders shall be three-pole, 600V rated units suitable for use with Class CC, rejection type fuses. They shall be UL listed for branch circuit protection, and have a fuse withstand rating of 200 kA. The handle shall isolate the fuse from the circuit when installing or removing fuses— no special tools shall be required to insert or remove fuses. The fuse holder shall be provided with a blown fuse indicator to allow for easy troubleshooting. The fuse holder shall mount on a standard DIN rail.

The Fuse Holder shall be model 1492-FB3C30-L as manufactured by Allen Bradley, or equal. The fuses shall be Bussmann Limitron fast acting model KTK-R or equal, with the ampacity shown on the Drawings.

W-46.10 AC Current Sensor

The AC Current Sensor shall be a split core transducer used to convert a monitored AC current to a proportional 4-20mA output. The sensor shall comprise a current transformer, power circuit, precision rectifier, high-gain servo amplifier, and span and zero adjustments in one UL listed package. The sensor shall have three user selectable ranges. The two-wire loop powered 4-20mA output shall be available on two 6-32 screw terminals. The sensor shall meet the following performance parameters:

- 1.) operating temperature— -55 to +65°C.
- 2.) accuracy— +/- 0.5% of full scale
- 3.) repeatability— +/- 0.1% of full scale
- 4.) frequency— flat from 20-100 Hz
- 5.) response time— 100 msec (10 to 90%)
- 6.) ripple— less than 10 millivolts
- 7.) voltage supply— 21 to 40VDC

The AC Current Sensor shall be model SC200-2 as manufactured by Enercorp Instrument Ltd, or equal.

Pump Control Panel

The pump control panel shall be as defined in Sections W-46.01 General, W-46.02 Control Enclosures and Panels and shall contain, but not limited to the components listed in the sections W-46.11 thru W-46.25:

W-46.11 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-46.12 Pilot Lights

Pilot lights shall be heavy-duty, oil-tight, NEMA Type 4X, corrosion resistant, push to test, light emitting diode (LED) type, rated for 120VAC, 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-46.13 Control Relays

- a. Multicontact- Unless otherwise noted, relays shall have a minimum of two (2) form C contacts rated at 10 amps, 120 VAC. They shall be of the type, which utilizes the circular plug system with hold down springs. Each relay shall be provided with an indicator lamp to show its status. The covers shall be dustproof, and manufactured of a clear polycarbonate material. The relays shall be Model KRPA as manufactured by Potter & Brumfield, Struthers Dunn, Square D, or equal.
- b. Timing relays shall have DPDT, 10 amp, 120 VAC contacts. Timers shall be solid-state and adjustable as required. They shall utilize a plug in base mounting system. Timing relays shall be Model 328 as manufactured by ATC, Potter & Brumfield or equal.
- c. NEMA Type Relays shall have two (2) normally open, 10-amp, 600 VAC, convertible instantaneous contacts. They shall have plug-in contact cartridges for easy contact conversion and replacement. Contact conversion shall be capable without removing terminal screws or wires. Coil voltage shall be as shown on the drawings or as required. NEMA Type Relays shall be Model X as manufactured Square D or equal.

W-46.14 Instrumentation Signal Multicontact Relays

Relays for switching instrumentation level signals shall have the following features: 120VAC coil; 4PDT Ag-Pd alloy 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 200,000 operations at rated load.

The socket shall be of the surface or rail-mount design with screw terminals to facilitate circuit connections.

The relay shall be Idec model RY42, with model SY4S-05 socket, or equal.

W-46.15 Sewage Pump Controller / SCADA / Radio (PCSR)

The Sewage Pump Controller / SCADA / Radio subassembly comprises a programmable logic controller (PLC) based system engineered to provide duplex pump control, supervisory control and data acquisition (SCADA), and radio telemetry in one assembled package. The components shall be mounted on an aluminum sub-panel and be fully wired, tested, and ready for field connections via conveniently located interface terminals. The subassembly shall operate on a 120 Volt, 60 Hz, single-phase power supply and shall have integral transient voltage protection.

The PCSR shall be a Motorola ACE3600 package as distributed by Star Controls, Revere Control Systems, Automated Controls, Curry Controls, Rocha Controls or Cayzo Consulting Inc. The Contractor shall coordinate his efforts with Star Controls, Revere Control Systems, Automated Controls, Curry Controls, Rocha Controls or Cayzo Consulting Inc. to ensure system compatibility, performance, and security. The Contractor shall provide and install a complete control system package as programmed Star Controls, Revere Control Systems, Automated Controls, Curry Controls, Rocha Controls or Cayzo Consulting Inc. The existing Pump Station DCR controls shall revert to the City as a spare.

The following is a partial list of PCSR features:

1. Motorola ACE3600 remote terminal unit (RTU) with surge / lightning protection for power line and antenna shall be provided.
2. One Mixed I/O modules shall be provided.
3. A MOTOTRBO XPR5350 radio UHF R1 (430-470) MHz, shall be provided.
4. Provide one mixed signal auxiliary input/output interface board # ACE-V245-AUX-I/O with DC to DC plug in power supply# ACE-AUX-DCPS.
5. The pump controller shall operate independently of the SCADA / telemetry system in the event of communications loss.
6. DC power circuits derived from the RTU and feeding external loads shall be individually fused as required. Fuses shall have indicator LEDs to indicate fuse has blown.
7. A back-up pump controller shall be provided to facilitate emergency overflow protection in the event of RTU failure.
8. Interposing control relays shall be provided as required.
9. Terminal blocks shall be arranged, and separated as follows: main power distribution block; 120VAC power; 24VDC power; RTU DC power bus.
10. All wires shall be permanently identified using a computer generated labeling system. All terminal numbers and identifying nomenclature shall correspond to and be shown on the electrical diagrams and schematics.
11. All external wiring shall terminate on terminal blocks.
12. The RTU shall provide both digital and analog inputs for use in monitoring and control. Simultaneous monitoring of analog and digital level sensing devices shall be supported where the analog level sensing device shall be primary. The RTU shall contain routines for detecting sensor failures and utilize the alternate level sensing device(s).
13. Battery back-up power shall be provided for the RTU so that monitoring is maintained during Utility power failures. The battery shall have the capacity of operating the RTU for a minimum of four hours. The power supply shall keep the batteries at float charge. The RTU shall contain a low battery cutout circuit, and the batteries shall not be damaged by deep discharges.

14. Local manual pump control is provided by Hand-Off-Auto (HOA) switches located in the pump control panel. In the absence of RTU power or in the case of RTU failure, the pump motor starters shall remain operational in the HAND position. In no case shall the RTU have the capability to operate or override the pumps in the HAND or OFF positions.
15. The capability to remotely override or disable individual pumps shall be provided (local switches must be in the AUTO position).
16. The RTU shall have the capability to test the back-up pump controller by creating a high level condition and verifying that the back-up controller functions properly. In the event of a controller failure, the RTU will send an alarm to the Central HMI.
17. Capability shall be provided to configure from two to four pumps.
18. Individual pump run status shall be reported to the Central HMI.
19. The following pump failures shall be reported to the Central HMI: fail to start; fail to stop; premature stop; drive fault; and stator over temperature.
20. RTU configuration parameters shall be adjustable locally and remotely from the Central HMI.
21. A fail-safe input shall be provided indicating cabinet intrusion.
22. The RTU shall have the latest RTU SCADA application license compatible with the existing Central HMI configuration.
23. The following spare shall be provided:
 1. One (1) Motorola ACE 3600 RTU
 2. One (1) AC Power Supply
 3. Two (2) Mixed I/O
 4. Two (2) SCADA Interface Boards

W-46.16 Wet Well Level Monitoring System

The wet well level monitoring system shall be of the ultrasonic type. It shall consist of a transducer element and a transmitter/electronics package.

The transducer shall use a PZT ceramic element with a nominal operating frequency of 50kHz. The transducer shall have a range of 1 to 32.8 ft. The transducer shall convert a 24-volt input from the electronics package to a 3,000-volt peak-to-peak echo pulse. The transducer shall be Factory Mutual (FM) approved for use in a Class I, Div.1, group A, B, C, & D location. The transducer shall be rated intrinsically safe for zone 0. The transducer cable length shall be as required to provide a splice-free mechanization.

The transmitter/electronics package shall operate from 115Vac, 60Hz or 10 to 28Vdc power source. The unit will automatically switch to the dc source when Utility power is lost. The transmitter shall be compatible with a full line of transducers. The unit shall be simple to program via a hand-held programmer or laptop computer. Basic set-up and advanced echo analysis and diagnostics software shall be provided. A 4-20 mA output and two alarm relays shall be provided. A flashing LED shall indicate healthy status. An integral keypad and LCD display shall be provided. The accuracy shall be 0.25% of measured range and the resolution 0.1% of measured range. The unit shall be tropicalized and be housed in a NEMA 4X enclosure.

The wet well monitoring system shall be as manufactured by Pulsar, Inc., or equal (Transducer— dB10; Transmitter— Ultra-4)

W-46.17 Surge Protection Devices – Single Phase (SPD-2, SPD-3, SPD-4)

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 120 VAC single-phase, 3-wire (line, neutral, and ground). The maximum single impulse current shall be 2.5 kA.

1.) The clamp voltages for the SPD shall be the following:

- Line to neutral – 620 volts
- Line to ground – 850 volts
- Neutral to ground- 850 volts

The Surge Protection Device shall be Phoenix Contact PT 2-PE/S-120AC/FM model 2856812, or equal.

W-46.18 Panel Mount Terminal Blocks

Control terminal blocks shall be single pole units constructed of a polyamide plastic base with wire clamp terminals attached. The terminals shall be rated for 30 amps, 600 volts. The terminals shall accommodate #24 to #10 AWG conductors. The block shall mount on an aluminum DIN rail.

The terminal blocks shall be style UK5N, as manufactured by Phoenix Contact, or equal.

W-46.19 Control Panel Intrusion Sensors

The control panel intrusion sensors shall be of the inductive proximity type, with an 18mm diameter cylindrical, short barrel body. The supply voltage rating shall be 12-24 VDC. The interface circuitry shall be standard 3-wire, PNP, shielded, and rated for a maximum load of 200mA, 600Hz. The output shall be normally open (N.O.) with short circuit protection. The unit shall have a temperature range of –13 to 158 degrees F. The detecting distance shall be 5mm, with a LED indicator.

The proximity sensor shall be Omron, model E2F-X5F1 (Grainger # 1EA77) with Square D mounting hardware model XSZB118 (Grainger 5B233), or equal.

W-46.20 Control Transformers

The control transformer shall be an individual output type for primary and secondary voltages as shown. The secondary shall be grounded and circuit breaker protected. The control transformer shall have sufficient capacity to provide the energy demands for all connected control components including relays, solenoids, and other indicated items.

The electrical performance shall exceed the requirements of ANSI/NEMA ST-1. The transformers shall be as manufactured by Square D, General Electric, Westinghouse, or equal.

W-46.21 Back-Up Pump Controller and Float Switch

The Back-Up Pump Controller shall be designed to run one or two pumps for a fixed time interval, set by the user, when the primary wet well level controls fail. The unit shall monitor a backup

level alarm in the wet well and start up to two pumps when the high alarm float switch closes. When the high-level float switch closes, the back-up unit closes a relay that starts Pump #1 and starts an internal Timer #1. When Timer #1 reaches its set time, and the level-alarm float switch is still closed, Pump #2 is started. Pump #1 and Pump #2 will run until the level-alarm float switch opens. When the level-alarm float switch opens, Timer #2 is started and both pumps continue to run until Timer #2 reaches its set time.

The Back-Up Pump Controller shall be Wilkerson model DR1920, or equal.

The float shall be SPDT mercury switch with polypropylene casing, built in weight, and 30' cord length, as manufactured by Anchor Scientific Roto-Float, Type S, or equal.

W-46.22 Level Monitor Backup

The Level Monitor Backup shall consist of output connections to the Auxiliary inputs of the PCSR ACE Power Supply.

W-46.23 Process Meter

The Process Meter shall indicate the wet well level (in feet) as received from the station's proposed level detection system.

The process meter shall include 4-20 mA input and a 4-20 mA output with the following:

- 1.) 4-Digit 1.20" (30.5 mm) display
- 2.) Max/Min display
- 3.) Type 4X, NEMA 4X, IP65 front
- 4.) Universal power supply 85-265 VAC
- 5.) 24 VDC @ 200 mA transmitter power supply
- 6.) Shallow depth case 3.6" behind panel
- 7.) Sunlight readable display

W-46.24 Area Light Switch

General: Provide toggle switch of specification grade rated 20-amperes, 120-277 volts ac conforming to Fed. Spec. WS 896 and UL Standard 20. Switch shall be provided with back and side wired binding screw type terminals, one-piece spring contact arm and terminal plate with silver alloy contacts, one-piece steel mounting strap with an assured grounding clip. Provide ivory toggle.

The Area Light Switch shall be single-pole switch, Hubbel model HBL1221, or equal.

Miscellaneous

An emergency receptacle, lightning arrester, meter socket, and line-side phase monitor shall be installed and as defined in sections W-46.25 Emergency Receptacle, W-46.26 Lightning Arrester, W-46.27 Meter Socket, W-46.28 Line-Side Phase Monitor, W-46.29 Junction Boxes, and W-46.30 SCADA Antenna.

W-46.25 Emergency Receptacle

The emergency receptacle shall be of the heavy-duty, circuit breaking type with a weatherproof aluminum housing. The current rating shall be as shown with an operating voltage of 600 VAC. The receptacle assembly shall include a wiring box and angle adapter. The receptacle shall be equipped with a 4-pole exposed contact interior (reversed contacts). The receptacle shall be provided with a spring-loaded cap to cover the contacts when the receptacle is not in use.

The emergency receptacle shall be Crouse-Hinds Arktite w/ AJA6 angle adapter, model AREAL-20416-S22, or equal.

W-46.26 Lightning Arrester

The lightning arresters shall be suitable for use in a 480 Volt, 3-phase, 4-wire, Wye service and have the following characteristics.

- a) Type 1 SPD, UL 1449, 4th Edition approval
- b) UL96A Lightning Protection approval
- c) NEMA 4X enclosure for outdoor use
- d) LED status indicator (ON=good, OFF = replace)
- e) Incorporate thermally protected MOVs
- f) Fits 3/4" knockout with 3' leads
- g) 2 years
- h) Nominal Discharge Current Rating: 10 kA
- i) Maximum Continuous L-N / HL-N Voltage: 1800
- j) Maximum Continuous L-G / HL-G Voltage: N/A
- k) Maximum Continuous L-L / HL-L Voltage: 3000

The lightning arrest shall be as manufactured by Mersen, Square D, General Electric, or equal.

W-46.27 Meter Socket

The meter socket shall be of aluminum construction with a large closing plate and quadplex ground. The meter socket shall contain a 3-phase, 4 wire and a lever bypass.

The meter socket shall be Milbank, model UAP3566-X-HSP. (Rating: 400 Amps @ 480 V.)

W-46.28 Line-Side Phase Monitor

A Phase Monitor, PM1, shall be provided and installed on the line-side of the utility main as shown on the Drawings and specified herein. See section W-46.08 Power Phase Monitors for features.

W-46.29 Junction Boxes

A pump motor junction box and instrumentation junction box shall be provided and installed as shown on the drawings and specified herein. Junction boxes shall be NEMA 4X, stainless steel with hinged doors and a stainless-steel louver plate kit.

The junction box shall be Hammond Manufacturing, or equal.

W-46.30 SCADA Antenna

The SCADA antenna shall be UHF and 360 fully welded gold. The antenna frequency shall be 450-470 MHz, 3 elements, 7.1 dBd gain, 17 dB front-back ratio with 20-3/16" boom length and 7/8" boom diameter.

The SCADA Antenna shall be Laird Technologies, model Y4503, or equal.

* * *

SECTION 47 - ELECTRIC MOTORS

W-47.01 General:

Electric motors shall be of the high energy efficient and high-power factor type in full compliance with the "Federal Energy Policy Act of 1992." Motors shall be mounted on the equipment being driven. Motor characteristics shall be as specified under the Workmanship and Materials sections for equipment.

W-47.02 Design:

Motors shall conform to the latest ANSI Standards for rotating electrical machinery and in matters not covered therein, the latest NEMA Standards for motors and generators shall apply.

W-47.03 Ratings:

Motors shall have suitable output torque and speed characteristics to operate the driven equipment under design load conditions without exceeding their nameplate ratings. They shall have a 1.15 service factor. Definite purpose motors shall be used on specialized equipment requiring them.

Motors supplied for use with Variable Frequency Drives (VFD) and Reduced Voltage Solid State Starters (RVSS) shall be rated for inverter duty.

Ratings shall be based on NEMA Class B, 80 degrees C, temperature rise at rated conditions above an ambient of 40°C and shall have Class F moisture resistant insulation. This temperature rise shall be for continuous operation unless otherwise specified or approved.

W-47.04 Operating Types:

Motors of 1/2 HP or larger shall be of the squirrel-cage induction type, designed for 3-phase, 60-Hertz, 460-volt operation, unless shown or specified otherwise. Smaller motors shall be of the capacitor induction type designed for single-phase, 115-volt, 60-Hertz operation unless otherwise noted or approved.

All motors, except where the driven equipment presents unusual requirements, shall have torque and locked rotor characteristics as outlined in the NEMA Standards for Design B.

All gear motors and speed reducers shall be designed for correct mounting position and rated in accordance with the application practice outlined in the Standards of the American Gear Manufacturers Association, for Class II service.

W-47.05 Bearings:

All motor bearings shall be of the antifriction type except where otherwise shown or specified. All antifriction bearings shall have a minimum rating life of 100,000 hours, based on a

reliability of 90 percent in accordance with ANSI B3.15. All motor bearings shall be oil or grease lubricated with convenient provisions for inspecting and servicing.

W-47.06 Mechanical Protection:

Motors shall be cast iron (including fan cover), rated severe duty, totally enclosed, and corrosion resistant, (mill and chemical duty type), unless a higher classification is required by the intended service. Vertical motors shall have solid shafts with high ring bases having ample space for coupling adjustments.

All motors shall be fan cooled except for smaller sizes (approximately 2 HP and less). All totally enclosed motors shall be tapped at a low point and fitted with an Appleton ECD 1/4-inch drain fitting.

W-47.07 Installation:

Motors shall be of the right- or left-hand assembly, as required, so that the conduit box and nameplate will be readily accessible.

W-47.08 Performance Data:

Motor make, type and rating, speed-torque curves, along with the outline dimensions and the guaranteed full load and locked rotor amperes at full voltage, shall be presented with the equipment details for review and approval.

Motors shall have the following minimum full load efficiency and uncorrected power factor ratings (efficiencies and power factor of motors at other speeds shall be as specified with driver equipment):

Motor Efficiency and Power Factor - Minimum Percent

Horsepower	<u>At 1800 RPM</u>		<u>At 1200 RPM</u>	
	<u>Efficiency</u>	<u>Power Factor</u>	<u>Efficiency</u>	<u>Power Factor</u>
1	82.5	74.3	80.0	69.7
1-1/2	84.0	76.5	85.5	62.0
2	84.0	70.3	86.5	70.1
3	87.5	79.9	87.5	73.7
5	87.5	83.8	87.5	75.8
7-1/2	89.5	82.4	89.5	78.2
10	89.5	85.0	89.5	76.4
15	91.0	85.0	90.2	81.1
20	91.0	84.6	90.2	81.9
25	92.4	84.5	91.7	82.0
30	92.4	84.2	91.7	82.5
40	93.0	84.2	93.0	83.3
50	93.0	85.0	93.0	84.9
60	93.6	86.8	93.6	85.7

75	94.1	86.6	93.6	86.0
100	94.5	88.3	94.1	86.4
125	94.5	89.3	94.1	85.8
150	95.0	88.5	95.0	87.5

The machine noise of the motors shall not exceed the following sound power levels when measured in accordance with IEEE Standard 85:

<u>Overall Sound Power Level, Decibels, A-Weighted</u>		
<u>Horsepower</u>	<u>At 1800 RPM</u>	<u>At 1200 RPM</u>
1 - 2	70	67
3 - 5	74	71
7-1/2 - 10	77	74
15 - 20	81	78
25 - 30	85	80
40 - 50	89	84
60 - 75	90	88
100 - 150	90	93

W-47.09 Test Reports:

Unless the equipment specifications stipulate shop tests reports on the actual motors used the test data shall be on a representative motor of the same horsepower and speed. They shall show the motor full load and locked rotor amperes and full load efficiency and power factor rating, and be recorded on standard test forms as outlined in the NEMA Standards.

W-47.10 Painting:

Painting shall meet the requirements of the Workmanship and Materials section headed "Painting." All steel parts shall be chemically treated to ensure clean surfaces, then given a rust-resistant undercoat. Screws, nuts, bolts and similar items shall be of nonferrous metal or have an approved rust-resistant finish.

* * *

SECTION 48 – HEAVY-DUTY DOUBLE THROW FUSIBLE SWITCH

W-48 General

Furnish and install a Heavy-Duty Double Throw Fusible Switch (DTFS) having the ratings, features / accessories and enclosures as specified herein and as shown on the Contract Drawings.

1. References

A. The double throw switch and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:

1. UL 98
2. NEMA KS-1

2. Submittals – For Review/Approval

A. The following information shall be submitted to the Engineer:

1. Dimensioned outline drawing
2. Conduit entry/exit locations
3. Switch ratings including:
 - a. Short-circuit rating
 - b. Voltage
 - c. Continuous current
4. Fuse ratings and type
5. Cable terminal sizes
6. Product data sheets

3. Submittals – For Construction

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in section 2, and shall incorporate all changes made during the manufacturing process.

4. Qualifications

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

5. Ratings

- A. Provide safety switch as shown on drawings with the following ratings:
 - 1. 30 to 800 amperes
 - 2. 600 Volts AC
 - 3. 3-pole
 - 4. Upper utility switch shall be: fusible
 - 5. Lower emergency switch shall be: fusible
 - 6. Mechanical lugs suitable for aluminum or copper conductors.

6. Construction

- A. Switch blades and jaws shall be visible and plated copper,
- B. The switch shall have a red handle that is easily pad-lockable with three 3/8-inch shank locks in the OFF position,
- C. Switches shall be of double throw design such that both switches may not be closed simultaneously. Handle operation shall have an “off” position between the two on positions,
- D. Switches shall have deionizing arc chutes,
- E. Switches shall have factory-installed ground lug kit,
- F. Switch assembly and operating handle shall be an integral part of the enclosure base,
- G. Switch blades shall be readily visible in the “ON” and “OFF” position,
- H. Switch operating mechanism shall be non-teasable, positive quick-make/quick-break type; bail type mechanisms are not acceptable,

- I. Fusible switches shall be labeled as suitable for service entrance equipment,
- J. Switches shall have a solid or switched neutral as shown on the drawings,
- K. Switches shall have line terminal shields,
- L. Switches shall be suitable for systems capable of 100 kA at 600 V,
- M. Embossed or engraved ON-OFF indication shall be provided,
- N. Double-make, double-break switch blade feature shall be provided,
- O. Renewal parts data shall be shown on the inside of the door.

7. Enclosure

- A. Enclosure shall be NEMA 4X
- B. Paint color shall be ANSI 61 gray
- C. 600 and 800 amp enclosures shall include a “Z” mounting channel on the back for assistance in mounting.
- D. 600 and 800 amp switches shall be equipped with lifting eyes.

8. Accessories

- A. The following accessories shall be provided:
 - 1. Factory installed neutral kit
 - 2. Factory installed ground lug kit
 - 3. Factory installed Class R fuse clips
 - 4. Lock ON provisions

9. Spare Parts

The Contractor shall furnish two complete sets of each fuse type as spare parts.

10. Factory Testing

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

1. Insulation check to ensure the integrity of insulation and continuity of the entire system
2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards.
3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances.
4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic.

B. The manufacturer shall provide three (3) certified copies of factory test reports.

11. Installation

- A. The contractor shall install all equipment per the manufacturer's recommendations and the contract drawings.
- B. All necessary hardware to secure the assembly in place shall be provided by the Contractor.
- C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations.

12. Field Service

- A. The manufacturer of the DTFS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.

13. Manufacturer

- A. The DTFS Eaton model as shown on the Drawings Parts Schedule, or equal.

* * *

SECTION 49 - REDUCED VOLTAGE SOLID STATE STARTER

W-49.01 General

This section includes the requirements for the Reduced Voltage Solid-state Starter (RVSS) equipment.

The RVSS shall be designed for use with a standard three-phase, three-wire, squirrel cage, induction motor.

The unit shall be microprocessor based and programmed to slowly increase the voltage to the motor over an adjustable acceleration time, providing a shock free, smooth acceleration, while drawing the minimum current necessary to start the motor.

The RVSS shall be equipped with an internal by-pass contactor that will close at the end of acceleration time, thus reducing heating and saving power .

W-49.02 Acceptable Manufacturers

The Reduced Voltage Solid-state starter shall be a Solcon Industries Ltd. with Conformal Coated control boards.. Model numbers:

1. RVS-DX-44-480-115V-115V-8D

W-49.03 General Provisions

The RVSS shall be designed to meet the following specifications:

2. GENERAL

- a. Supply Voltage (Vn): V +10%-15%
- b. Frequency: 45 – 65 Hz
- c. Control Supply: 115 V +10% -15%
- d. Load: HP Per Drawings, 3-phase, three-wire, induction motors.
- e. Standard display along with a remote keypad

3. START-STOP PARAMETERS

- a. Motor FLA: Per Drawings
- b. Start/Stop Profile: Field Programmable
- c. Kick Start: A pulse of 80% Vn, adjustable range 0.1-1 Sec.
- d. Initial Voltage: 10-50% VN
- e. Initial Current: 100-400% of Motor FLA
- f. Current Limit: 100-400% of Motor FLA
- g. Acceleration Time: 1-30 Sec
- h. Deceleration Time: 1-30 Sec

4. MOTOR PROTECTION

- a. Too Many Starts: Maximum number of starts, range: OFF or 1-10, during a time period of 1-60 min.
- b. Starts inhibit: Period of 1-60 min, during which starting is prevented, after too Many Starts Fault.

- c. Long Start Time: Maximum allowable starting time 1-30 sec.
- d. Over Current (Instant): Two operation functions: during starting trips the starter at 850% and during running at 100-850% In, both within one Cycle (after internal delay).
- e. Overload Class: Overload Class shall be selectable between NEMA Class 10, NEMA Class 20, or NEMA Class 30. The cool down time after an overload shall be non-adjustable, fixed time setpoint.
- f. Under Current: Trips when current drops below 20-90% In, time delay 1-40 sec.
- g. Under Voltage: Trips when main voltage drops below 50-90%, time delay 1-10 Sec. w/ optional automatic reset.
- h. Over Voltage: Trips when main voltage increase above 110-125%, time delay 1-10 sec.
- i. Phase Loss, U/O Freq: Trips when one or two phases are missing and frequency is below 45Hz. or above 65Hz w/ optional automatic reset.
- j. Phase Sequence: Trips when phase sequence is wrong
- k. Shorted SCR: Prevents starting / trips if motor is not connected or incorrectly connected to the starter, or in case one or more SCRs have been shorted
- l. Heat Sink Over temp: Trips when heat-sink temperature rises above 85°C.
- m. External fault: Trips when an External Contact closes for 2 sec.

5. CONTROL

- a. Displays: LCD (2-lines of 16 characters) and 4 LEDs.
- b. Keypad: 6 keys for easy setting
- c. Fault Contact: 2 Contacts, 8A, 250VAC, 2000VA
- d. Aux. Contact: 2 Contacts, 8A, 250VAC, 2000VA

6. TEMPERATURE/HUMIDITY

- a. Operating Temp.: -10° to 40°C
- b. Storage Temp.: -20° to 70°C
- c. Humidity: 95% at 50°C or 98% at 45°C.

7. STANDARDS

- a. Dielectric Test: 2500VAC
- b. EMC Emissions: EN 55011 CISPR 11 Class A
- c. EMC Immunity: EN 55082-2 ESD 8KV air, IEC 801-2 Electric RF field 10 V/m, 20-1000MHz, IEC 801-3 Fast transients 2KV, IEC 801-4
- d. Safety EN 600947-1 Related to safety requirements. Designed and assembled to conform with UL508C

SECTION 51- AUTOMATIC TRANSFER SWITCH

W-51.01 General

- A. Section Includes: Requirements for providing automatic transfer switches.
- B. Related Work Specified in Other Sections Includes, But is Not Limited to, the following:
 - 1. W-45 – Electrical
 - 2. W-46 – Controls
 - 3. W-76 – Conduit, Wiring, and Grounding

W-51.02 Reference

- A. Codes and standards referred to in this Section are:
 - 1. NFPA 70 - National Electrical Code (NEC)
 - 2. NEMA ICS 10 - AC Automatic Transfer Switches
 - 3. UL 486A - Wire Connectors and Soldering Lugs For Use With Copper Conductors
 - 4. UL 1008 - Standard for Automatic Transfer Switches

W-51.03 System Description

- A. Design Requirements: Provide equipment capable of operating in an ambient temperature range of 0 to 40 degrees C and humidity of up to 90 percent noncondensing.
 - 1. Arrange the equipment for convenient and ready accessibility from the front, for inspection and maintenance of all devices, terminals and wiring.

W-51.04 Submittals

- A. General: Furnish all submittals, including the following, as specified in Specific/General Provisions and Section W-51.01.
- B. Product Data and Information: Furnish manufacturer's data for all associated equipment and devices indicating dimensions, size, voltage ratings, current ratings, withstand and interrupting ratings.
- C. Shop Drawings: Furnish shop drawings for automatic transfer switches to include the following:
 - 1. Outline drawings showing arrangement, elevations and identification of Components.

2. Bill of materials including manufacturers' name and catalog number.
 3. Interconnecting wiring diagrams.
 4. Individual schematic and wiring diagrams.
- D. Quality Control: Furnish the following test reports and certificates as specified in the Specific Provisions:
1. Certified Shop Test Reports for the automatic transfer switch and related components.
- E. Operation and Maintenance Manuals: Furnish operation and maintenance manuals as specified in the Specific/General Provisions.

W-51.05 Quality Assurance

- A. Codes: Manufacture all automatic transfer switches in accordance with NEMA ICS10, and UL 1008.
1. Manufacture and install each automatic transfer switch in accordance with the NFPA 70 and local codes.
- B. UL Label: Provide a UL Label on each automatic transfer switch.

W-51.06 Delivery, Storage, and Handling

- A. General: Deliver, store, and handle all products and materials as specified in Specific/General Provisions.
- B. Shipping and Packing: Provide all structures, equipment and materials rigidly braced and protected against weather, damage, and undue strain during shipment.
- C. Storage and Protection: Store all equipment and materials in a dry, covered, heated and ventilated location. Provide any additional measures in accordance with manufacturer's instructions.

W-51.07 Spare Parts

- A. General: Furnish the following spare parts:
1. Two complete replacements of all indicating lamps and fuses used in the installation.
 2. Two of each special tool required for maintenance.

- B. Packaging: Pack spare parts in containers bearing labels clearly designating contents and related pieces of equipment. Deliver spare parts in original factory packages. Identify all spare parts with information needed for reordering.

W-51.08 Acceptable Manufactures

- A. Acceptable Manufacturers: Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for review.
 - 1. Automatic Transfer Switch
 - a. ASCO Controls 7000
 - b. General Electric Zenith ZTS
 - c. Kohler Power Systems

W-51.09 Automatic Transfer Switch Requirements

- A. Description: Provide enclosed, double-throw automatic transfer switch with single operating mechanism.
- B. Configuration: Electrically-operated, mechanically held with required relays, controls, and contacts.
- C. The automatic transfer switch shall be standard transition type with an in-phase monitor to ensure that the pump motor back EMF will not trip any protective device when switching the motor load from the Generator source back to the Utility source. Scenarios where switching of the motor load activates any protective device (and thus deactivates the pump motor) will be addressed and corrected by the manufacturer at no cost to the owner.
- D. All elements of the drive system must be replaceable from the front of the switch, and the power switching devices must be replaceable without removal of the connecting cables.
- E. The transfer switch shall be listed under U.L. 1008, in a NEMA 1 enclosure.

W-51.10 Ratings

- A. Voltage: 480V
- B. Switched Poles: 3

- C. Amperage: 150A
- D. Loads: Combination tungsten, ballast, resistance, and inductive loads.
- E. Withstand and Closing Ratings: 35,000 minimum rms symmetrical amperes at 480V, when used with molded-case circuit breaker.
- F. Thermal capacity: 20 times continuous ampere rating at 60 cycles.

W-51.11 Components

- A. Phase Sequence: A-B-C, left to right, front to back, top to bottom.
- B. Contacts: Provide silver surfaced main contacts protected by a separate renewable arcing contact. Mechanically lock normal and emergency contacts by the operating linkage when in the open or closed position. Provide an operating linkage that will not permit a neutral position when a failure of any coil or disarrangement of any part occurs.
- C. Operating Mechanism: Isolate the mechanical driving system and mechanical interlocks to be electrically dead. Do not use molded plastic parts for the operating linkage between the electrical operator and the main operating shaft of the switch.
- D. Main Bearings: Radial, ball-bearing type.
- E. Sensing and Control Relays: Continuous-duty, industrial type with wiping contacts rated 10 amperes minimum.
- F. Control Logic: Solid-state, microprocessor-based with generator exercise accessories.
- G. Arc Barriers: Provide arc barriers and arc suppression for each pole.

W-51.12 Accessories

- A. Indicating Lights: Provide 30.5 mm, LED type indicating lights mounted in the cover of the enclosure to indicate the following:
 - 1. Utility available
 - 2. Generator available
 - 3. Load connection to Utility.
 - 4. Load connection to Generator.

- B. Test Switch: Mount in the cover of the enclosure to simulate failure of Utility or Generator.
- C. Full phase protection. Solid-state phase monitor shall be field adjustable, close differential type, with 85-100% pick-up and 75-98% drop-out. A single adjustment shall set all phases.
- D. Solid-state voltage and frequency monitor on generator output to prevent transfer prior to proper output parameters, adjustable 85-100% of generator rated voltage and frequency, with adjustable drop-out of 75-85% of pick-up setting.
- E. Adjustable, solid-state, 0.5 to 6 seconds time delay on engine starting to override momentary outages and nuisance voltage dips.
- F. Adjustable, solid-state, 2 to 30 minutes time delay on retransfer of load to normal.
- G. Adjustable, solid-state, 2 to 30 minutes cool-down timer wherein the generator set runs unloaded after retransfer to line.
- H. Motor load decay time delay, adjustable for 1.5 to 15 seconds and operating on transfer to either source.
- I. Adjustable, solid-state, 0.5 seconds to 5 minutes time delay on transfer to emergency source after verification of emergency source voltage and frequency.
- J. Test switch to simulate normal power failure, heavy duty, oil tight, pushbutton type with momentary contacts and override circuitry to revert to normal power if emergency source should fail during test.
- K. Three (3) pilot lights, to indicate the normal and emergency position of the transfer switch, and mode selector switch in "off" position.
- L. Engine starting contacts to provide for generator starting.
- M. Plant exerciser to start and run the generator set with or without load (in-field switchable) each 168 hours for a 30-minute interval.
- N. Four (4) position mode selector switch marked "test", "auto", "off", and "engine start".
- O. Equipment grounding lug.
- P. Cable connection lugs, cu/al type for all conductors.

- Q. A fully-rated solid neutral.
- R. Nameplates: Nameplates shall be rigid laminated phenolic with black surface and white core. Each nameplate shall be fastened to the compartment door with two (2) screws. The unit nameplates shall be 1" x 3" minimum with 1/8" high characters. Abbreviations are not acceptable.
- S. Finish: Smooth and clean the enclosures and prime coat the inside and outside surfaces. Standard indoor finish is gray ANSI No. 49.
- T. Phase Monitor Fuse Holders and Fuses
1. The Fuse Holders shall be three-pole, 600V rated units suitable for use with Class CC, rejection type fuses. They shall be UL listed for branch circuit protection, and have a fuse withstand rating of 200 kA. The handle shall isolate the fuse from the circuit when installing or removing fuses— no special tools shall be required to insert or remove fuses. The fuse holder shall be provided with a blown fuse indicator to allow for easy troubleshooting. The fuse holder shall mount on a standard DIN rail.
 2. The Fuse Holder shall be model 1492-FB3C30-L as manufactured by Allen Bradley, or equal. The fuses shall be Bussmann Limitron fast acting model KTK-R or equal, with the ampacity as shown on the Drawings.
- U. Power Phase Monitor
1. A Phase Monitor shall be provided and installed in the automatic transfer switch as shown on the Drawings and specified herein. The unit provided shall have the following features:
 - a. Input— 480 volt, 3-phase, 60Hz, 4-wire, utility service
 - b. Adjustable voltage range control
 - c. SPDT relay operation and LED indication shall be triggered by phase loss, low voltage, power failure, or improper phase sequence.
 - d. LED indication shall be on when voltage is normal— off with fault
 - e. Relay shall operate if fault lasts more than 2.0 seconds.
 - f. Relay shall release after voltage is normal for 5.0 seconds
 - g. Relay contact rating— 10 Amps
 - h. Mounting— 8-pin plug-in— provide socket for DIN rail
 2. Phase Monitor shall be model SUA-440-ASA as manufactured by ATC Diversified Electronics, or equal.
- V. Auxiliary Relays
1. Provide Two (2) auxiliary relays each with S.P.D.T. contacts that close

when connected to normal source and two (2) S.P.D.T. auxiliary contacts that close when connected to emergency source. Relays shall be utilized to interlock pumps while under generator power.

W-51.13 Enclosure

- A. Enclosure: NEMA 1
- B. Accessibility: Provide an enclosure with all current carrying contacts and parts readily accessible from the front for maintenance and inspection without removal of the switch panel, disconnecting of the operating linkage, or disconnecting of power conductors.

W-51.14 Automatic Sequence of Operation

- A. Controller: Provide a programmable, microprocessor-based controller to provide an automatic sequence of operation as follows:
 - 1. The automatic transfer switch controller shall start the generator and initiate a transfer to the generator when Utility power falls below the following thresholds:
 - a. Utility voltage drops below 85 percent from rated nominal value or frequency varies more than 10 percent from rated nominal value.
 - 2. Once Utility power has been restored to normal values, the transfer switch shall retransfer the load from the generator back to the Utility source (after an adjustable time delay).

W-51.15 Installation

- A. General: Install all equipment in accordance with the manufacturer's recommendations and approved shop drawings and as specified in the Specific Provisions.
- B. Cable Connections: Terminate and label all field wiring per the approved diagrams.
- C. Torque Requirements: Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturers' published torque tightening recommendations. Where manufacturers' torquing requirements are not available, tighten connectors and terminals in accordance with UL Standard 486A.

W-51.16 Field Quality Control

- A. Inspections: Inspect, adjust and check the installation for physical alignment,

cable terminations and ventilation.

- B. Adjustments: Make all necessary adjustments to the equipment to provide complete and satisfactory operation upon completion of the Contract.
- C. Tests: Perform field tests as follows:
 - 1. Inspect and test the installation with respect to the safety requirements of NFPA 70 pertaining to grounding and insulation resistance.
 - 2. Demonstrate proper operation of the automatic transfer switch by simulating conditions.
 - 3. Repair or replace defective materials at no cost to the OWNER.

W-51.17 Operation Demonstration

- A. Manufacturer's Representative: Provide the services of the automatic transfer switch manufacturer's representative to assist in installation, start-up, field testing, calibration, placing into operation and providing training, as specified in the Specific/General Provisions. The representative is required to carry out a thorough inspection of the installation and certify that the installation is correct and complete in accordance with the manufacturer's instruction and to confirm that the automatic transfer switch is ready for the final acceptance. Also to instruct operating personnel in the operation and maintenance of the automatic transfer switch.
- B. Training: Following completion of installation and field testing provide training for 6 employees of the OWNER in the proper operation, troubleshooting and maintenance of the equipment as outlined below. All training will be at the OWNER'S facilities at a time agreeable to the OWNER:
 - 1. Operational Training: A minimum of one 2-hour sessions combining both classroom and hands-on instruction, excluding travel time.
 - 2. Maintenance Training: A minimum of one 2-hour sessions combining both classroom and hands-on instruction, excluding travel time.

END OF SECTION

SECTION 67 - STEEL PIPE AND FITTINGS

W-67.01 General

Steel pipe and fittings include all wrought and fabricated steel pipe, stainless steel pipe, and fittings therefor. Steel pipe shall be used only where specifically shown or specified.

Completely detailed working drawings shall be submitted by the Contractor for approval in conformance with the requirements of the General Provisions. Such drawings shall show piping layouts and contain schedules of all pipe, fittings, valves, expansion joints, hangers and supports, and other appurtenances. When any of the steel pipeline work is of special design, such work shall be shown in large detail and be completely described and dimensioned.

W-67.02 Stainless Steel Pipe Standards

All stainless steel pipe and fittings shall be fabricated from stainless steel sheet and conform to ASTM A312, Type 316L. Carbon content of Type 316L material shall be 0.03 percent maximum. Finish shall be No. 1 or No. 2D.

Pipe shall be die-formed or rolled true to dimension and round. Tolerances for length, inside and outside diameter and straightness shall conform to ASTM A530. The two edges of sheet shall be brought to line so as not to leave a shoulder on the inside of the pipe. Ends of pipe and fittings shall be perpendicular to the longitudinal axis. Longitudinal seams on pipe and fittings shall be welded by either the tungsten gas or the metallic-gas method. The interior welds shall be smooth, even and shall not have an internal bead higher than 1/16-in. All pieces shall be marked with gauge and type of stainless steel and with the initials of the inspector marked on the inside of each piece, at each end.

Stainless steel piping shall be fabricated 316L Sch. 40.

Fittings shall be smooth curve type manufactured to ASTM A403. Fittings shall conform to ANSI B16.9.

Flanges for pipe larger than 4-in. shall have stub ends or rolled angle rings of the type of stainless steel as the pipeline welded to the pipe end, with suitable gaskets between the mating surfaces and joined through the use of 125 lb. rated back-up flanges, drilled to ANSI B16.1, and made of Type 316 stainless steel. Where the pipe stub is to pass through a sleeve during installation, a split-type back up flange shall be used. Bolts, washers, nuts and other hardware for flange bolting shall be Type 316 stainless steel.

Gaskets for flanged connections shall be a minimum of 1/16-in thick and shall be Nitrile rubber.

All stainless steel pipe and fittings shall be pickled at the point of manufacture, scrubbed and washed until all discoloration is removed in accordance with ASTM A380. Pipe and fittings shall be sandblasted and cleaned with solvent or other means acceptable to the Engineer.

W-67.03 Welding

Shop welding of fabrications shall be done according to the procedures and by welders certified per ASME Section IX. Welds shall be by an inert gas shielding process using only extra low carbon filler metals. Welds shall have a bead height of no more than 1/16-in. Butt welds shall have 100 percent penetration to the interior or backside of the weld joint. Cross-sectional thickness of welds shall be equal or greater than that of the parent metal.

Welding in the field shall be done only if approved by the Engineer. Field welds shall be made by welders certified under ASME Section IX and be equal in all respects to shop welds. After field welding has been done, all joints shall be thoroughly cleaned and buffed using deburring and finishing wheels.

W-67.06 Expansion and Flexible Couplings

Ample provision shall be made for flexibility in all pipelines to compensate for expansion. Expansion devices shall be adequate to allow the lines to expand and contract freely without injury to any part of the piping system. The devices may be in the form of expansion joints, expansion couplings, swivel or swing joints or pipe bends, and include such anchors as may be shown, specified, or required to make the devices effective. If expansion devices are not required, all runs of pipe subject to change in length shall be fabricated shorter than their theoretical length to the extent that there may be freedom to expand without increasing the stresses imposed when cold.

Expansion joints shall be provided with adequate tie rods to limit the axial movement at the specified test pressures, except where otherwise noted or specified.

W-67.07 Handling

During loading, transportation, and unloading, extraordinary care shall be taken to prevent injury to the pipes and coating. Loading and unloading shall be done slowly with each pipe under perfect control at all times. Under no circumstances shall a pipe be dropped. Suitable skids or blocks shall be placed under each pipe in the shop and the pipe shall be securely wedged during transportation to ensure the least possible injury to pipe.

Pipe shall be handled with equipment such as stout canvas slings and wide padded skids, designed to prevent damage to the coating. The use of bare cables, chains, hooks, metal bars, or narrow skids in contact with the coating will not be permitted. All pipe handling and hauling equipment shall meet the approval of the Engineer before use.

Pieces shall be examined for defects and no piece shall be installed which is known to be defective. If any defective piece should be discovered after having been installed, it shall be removed and replaced with a sound one in a satisfactory manner by the Contractor at his own expense.

W-67.08 Erection

Steel pipelines shall be furnished, fabricated, erected, and otherwise installed to the lines,

elevations, locations, and dimensions shown, specified, and required for a complete installation. In all existing structures and new structures as applicable, the Contractor shall verify all dimensions shown on the Plans and shall take such field dimensions that may be necessary to properly fabricate, locate, erect, connect to existing work, and otherwise install all steel pipelines, pipe supports, pipe anchors, and structural frames required for steel pipelines. Where temporary supports are used, they shall be sufficiently rigid to prevent shifting or distortion of the pipe. Expansion devices shall be properly adjusted so that pipelines will be tight during expansion and contraction.

W-67.09 Hangers and Supports

All steel pipelines shall be permanently erected and supporting devices shall be furnished and installed as specified on the construction plans.

W-67.10 Linings and Coatings - General

In general, all linings and coatings, except coatings applied as field painting, shall be shop applied.

Linings and coatings, where such are specified, shall be applied to all pipe and fittings.

All bolts, nuts, couplings, and the like shall be well coated after the joint has been made.

Painting shall conform to the Workmanship and Materials section headed "Painting."

* * *

SECTION 72 - TELEVISION INSPECTION

W-72.01 General

TV inspections of gravity sewers shall be performed by means of a radial view closed-circuit color television camera. The inspection will be done one manhole section at a time. Flow in existing gravity sewers sections requiring inspection shall be maintained and controlled as required to allow passage of the camera and to allow a visual inspection of the entire circumference of the pipe along the length of the pipeline. Contractor will be required to submit methods for controlling flow and maintaining service during these inspections. Prior to the inspection of newly constructed gravity sewers, water shall be run through the pipeline so that depressions or dips in the alignment can be identified during the inspection.

W-72.02 Camera

The television camera used for the inspection shall be specifically designed and constructed for inspections of pipelines. The camera shall be capable of providing a radial view for inspection of the top, bottom, and sides of pipe and for looking up lateral connections. The camera shall be mounted on adjustable skids, or self propelled, to keep it in the center of the pipe. Lighting of the camera shall be supplied by a lamp on the camera, capable of being dimmed or brightened remotely from the control panel. The lighting system shall be capable of lighting the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions and shall have a minimum of 650 lines of resolution. The camera, television monitor, recording devices, and other components of the video system shall be capable of producing a picture quality satisfactory to the Engineer.

The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire sewer section, the Contractor shall immediately report this information to the City. For post-construction inspections of Developer installed projects, the owner shall be notified of the problem and shall repair the deficiency to the City's satisfaction.

When manually operated winches are used to pull the television camera through the line telephones or other suitable means of communication shall be set up between the two manholes of the section being inspected to ensure good communications between members of the crew.

W-72.03 Measurements

The importance of accurate distance measurements is emphasized. A distance meter shall be used for accurately recording the location of defects and key features along the pipeline. The distance meter shall be a direct reading, above ground, friction clamp device or other suitable

equipment. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. The meter shall be capable of reducing readings for reverse movement of the camera and shall be capable of being manually re-zeroed for each new setup. The importance of accurate distance measurements is vital. Accuracy of the measurement meter shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device. Footage measurements shall begin at the centerline of the starting manhole and end at the centerline of the ending manhole. Footage shall be shown on the video view and recorded at all times.

W-72.04 Documentation of Inspection

Written television inspection reports shall be provided for each line segment inspected to document defects and key features along the pipeline. The National Association of Sewer Service Companies (NASSCO) coding system shall be used. Information that should be included in the inspection logs is indicated below. One (1) copy of these records shall be supplied to the City.

Video recordings shall also be supplied to provide a visual and audio record of the TV inspection. Video playback shall be at the same speed that it was recorded. A complete recording shall be made of each line televised. A voice recording shall be included that provides brief and informative comments on the sewer conditions. **All television inspection videos shall be in DVD format. Video tapes in VHS format will not be accepted.** The video file shall be an MPEG4 viewing format and compatible with viewing in Microsoft Windows Media Player.

Inspection reports shall use NASSCO standard coding system and shall include, but not be limited to, the following information:

- Date, time, city, street, name of operator, inspector, and weather conditions.
- Pipe diameter, pipe material, section length, depth of pipe, length between joints, and corresponding video recording identification.
- Location of each point of leakage.
- Location of each service connection.
- Location of any damaged sections, nature of damage, and location with respect to pipe axis.
- Deflection in alignment of grade of pipe.

Video recordings shall include written information on the screen and an audio recording describing the inspection and findings. The DVD shall be labeled with information on the location of the inspection, description of the sewer lines, date, inspection company, and other information to identify the inspections included on the DVD. The following information shall be included in video:

Visual (on screen in corner):

- Report number.
- Date of television inspection.
- Sewer section and number.
- Pipe size and material
- Distance along reach (tape counter footage).

Audio:

- Date and time of television inspection, operator name, name of overlying or adjacent street, and manhole numbers.
- Verbal confirmation of sewer section and television direction in relation to direction of flow.
- Verbal description of pipe size, type, and pipe joint length.
- Verbal description and location of each service connection and pipe defect.

SECTION 73–RESTRAINING DEVICES

W-73.01 General

Restraint devices for mechanical joint fittings and appurtenances conforming to either ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53, shall conform to the following:

Restraint devices for nominal pipe sizes 3 inch through 36 inch shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10.

The devices shall have a working pressure rating equal to that of the pipe on which it is used but a minimum 100 psi. Ratings are for water pressure and must include a minimum safety factor of 2:1 in all sizes.

W-73.02 Material

Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.

Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.

Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.

W-73.03 Gaskets

Mechanical joint gasket shall be of a design that causes the gasket to deflect approximately 30% during assembly of the mechanical joint. The gasket material shall conform to the requirements of ANSI/AWWA C111/A21.11, section 11-6.4, of the latest revision.

W-73.04 Traceability

An identification number consisting of year, day, plant and shift (YYDDD) (plant designation) (Shift number), shall be cast into each gland body.

All physical and chemical test results shall be recorded such that they can be accessed via the identification number on the casting. These Material Traceability Records (MTR's) are to be made available, in hard copy, to the purchaser that requests such documentation and submits his gland body identification number.

Production pieces that are too small to accommodate individual numbering, such as fasteners and wedges, shall be controlled in segregate inventory until such time as all quality control tests are passed. These component parts may then be released to a general inventory for final assembly and packaging.

W-73.05 Installation

Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly.

Proper actuation of the gripping wedges shall be ensured with torque limiting twist off nuts.

W-73.06 Approvals

Mechanical Joint Restraints shall be listed by Underwriters Laboratories in the 4 inch through 12 inch sizes.

Mechanical Joint Restraints shall be Factory Mutual Approved in the 4 inch through 12 inch sizes.

Mechanical Joint Restraints, 4 inch through 24 inch, shall meet or exceed the requirements of ASTM F1674 of the latest revision.

Mechanical joint restraint shall be Series 2000PV for PVC pipe and Series 1000 for DIP pipe produced by EBAA Iron Inc. or approved equal.

W-73.07 Coating System

Coating for restraint devices shall consist of the following:

All wedge assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid Xylan® fluoropolymer coating with heat cure to follow each coat.

All casting bodies shall be surface pretreated with a phosphate wash, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact and UV resistance.

The coating system shall be MEGA-BOND by EBAA Iron, Inc. or approved equal. Requests for approved equal must submit coating material and process details for review.

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 Conduit

Liquidtight Flexible Nonmetallic Conduit (LFNC)

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.

Liquidtight Flexible Metallic Conduit (LFMC)

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 conduits 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.

All conduit shall be securely fastened in place and supported at maximum 5 feet intervals.

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.

If equipment is subject to adjustment, mechanical movement, or vibration, conduit

connections shall be made with approved flexible conduit and conduit connections shall be watertight. Flexible conduit shall not be installed in lengths longer than 3 feet. Flexible conduit shall transition to rigid aluminum conduit using an approved conduit fitting.

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, unless noted otherwise. All material installed in hazardous areas shall be listed as complying with the requirements of the U.L. Inc. for use in Class I, Group D atmospheres. Terminal Boxes and Enclosures mounted in Hazardous Areas shall be NEMA 7, cast aluminum.

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 devices, bus bars or motors shall be made up with a flat washer, a Belleville washer, and a locknut. The length of the bolt shall not extend more than a couple of threads past the end of the locknut. Lugs shall have holes that match the size of the bolt. The minimum size for feeder lugs shall match the bolt size of lugs on motor wiring. If motor lugs don't match, lugs shall be changed to match size of bolt, using a proper crimping tool.

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, bus bars or motors shall be made up with a flat washer, a Belleville washer, and a locknut. The length of the bolt shall not extend more than a couple of threads past the end of the locknut. Lugs shall have holes that match the size of the bolt. The minimum size for feeder lugs shall match the bolt size of lugs on motor wiring. If motor lugs don't match, lugs shall be changed to match size of bolt, using a proper crimping tool.

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.

Stranded copper wire size no. 8 AWG and smaller for terminal block connections, shall be made with a ferrule to wire termination. The ferrule shall be insulated and extend from the stripped insulation, then compressed with a properly sized crimping tool. The ferrule shall be manufactured by Phoenix Contact, or equal.

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.

Lug terminations at motor connections shall be insulated using three layers of tape. The first layer shall have a wrap of varnished cambric tape (Scotch 2520 or equal). As an alternative to varnished cambric tape, self-fusing silicon rubber tape (Scotch 70 or equal) or vinyl electrical tape (Scotch 33, 88 or equal) may be used. If vinyl electrical tape is used, the wrap shall be installed upside down. The second layer shall have a wrap of rubber splicing tape (Scotch 23, 130C, or equal). The third layer shall have a wrap of vinyl electrical tape (Scotch 33, 88, or equal).

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.

Color Coding:

PHASE	208/120 VOLTS	240/120 VOLTS	480Y/277 VOLTS
A	Black	Black	Brown
B	Red	Orange (High-Leg)	Orange
C	Blue	Blue	Yellow
Neutral	White	White	Gray or White
Ground	Green	Green	Green

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.

* * *

SECTION 345 - PORTLAND CEMENT CONCRETE

W-345.01 General

This section specifies the requirements for the materials for all classes of concrete, and includes methods and equipment for the handling and storing of the materials and the mixing and transporting of the concrete to the site.

The concrete shall be composed of a mixture of portland cement, fine aggregate, coarse aggregate and water and, where specified or allowed by the specifications, shall include approved admixtures.

Unless written permission is obtained, coarse aggregate of different types shall not be mixed; used alternately in sections of concrete pavement less than one mile in length; nor shall coarse aggregates of different types be used in any one continuous pour.

W-345.02 Types of Cement to be Used

Unless the particular type of cement is designated in the plans or special provisions, either Type I, Type I-S, or Type II portland cement may be used for any class of concrete. Type III cement may be used in all concrete (except for composite concrete and steel piles) provided that a retardant admixture is used in concrete for bridge decks and for cement concrete pavement.

Type I-P cement will be allowed as an alternate to Type I in all classes of concrete and soil-cement work subject to the following conditions:

- (a) Type I-P Portland Pozzolan Cement shall meet the requirements of ASTM C 595 except that the pozzolan constituent (fly ash) shall not exceed 20 percent by weight.
- (b) The pozzolan shall conform to ASTM C 618, Type C or Type F, except that the loss on ignition for Type F shall not exceed six percent.
- (c) The Contractor shall assume full responsibility for obtaining concrete having the minimum strength requirements set forth in the specifications.

Fly ash may be used to replace up to 20 percent by weight of the cement content in all classes of concrete where Type I, Type II, or Type III cement is used, in accordance with the following conditions:

- (a) The fly ash shall conform to ASTM C 618, Type C or Type F, except that the loss on ignition for Type F shall not exceed six percent.
- (b) Fly ash will not be permitted with Type I-S cement.
- (c) The Contractor shall assume full responsibility for obtaining concrete having the minimum strength requirements set forth in the specifications.

Fly ash may be used to replace not more than 20 percent by weight of the cement used in

concrete pavement.

W-345.03 Classification of Concrete

The separate classifications of concrete prepared under these specifications are designated herein as Classes I through IV, in accordance with the intended use and the proportions, strength, and other requirements.

Locations of Use of Each Class

- (a) Class I concrete shall be used for cement concrete pavement (both plain and reinforced) and for headwalls, curb and gutter, valley gutter, slope pavement, ditch pavement, pipe endwalls, and other miscellaneous concrete items which are not structurally reinforced.
- (b) Class II concrete shall be used for bridge concrete and box culverts, except where Class III or Class IV is specifically required for such uses, as specified below. Class II shall also be used at other locations as may be specifically called for in the plans or in the special provisions.
- (c) Class III concrete is required for the following uses:
 - (1) For prestressed members.
 - (2) For concrete piles of all types.
 - (3) For seal concrete in foundation areas where the concrete must be placed under water and the foundation cannot be dewatered before the concrete is placed.
 - (4) For bridge concrete and other work where specifically required by the plans.
- (d) Class IV concrete shall be used for all concrete (except seal concrete) placed in a location which is in or over salt or brackish water, and elsewhere as may be specifically called for in the plans.

High Early Strength Concrete

High early strength concrete is determined under either of the two following criteria:

- (a) Any class concrete may be converted to high early strength concrete by using Type III portland cement in accordance with the master proportion table subject to restrictions in use as outlined in 345.02.
- (b) When approved, a higher class (greater strength) concrete may be substituted for a lower class (less strength) concrete, in which case the higher class concrete substituted will be considered high early strength concrete for that application as follows:

- (1) Class IV (minimum required strength 5,500 psi) when substituted for Classes II and I.
- (2) Class III when substituted for Classes II and I.
- (3) Class II when substituted for Class I.
- (4) Class IV concrete (minimum required strength 5,500 psi) when substituted as high early strength concrete for Class IV concrete (minimum required strength 3,400 psi).

W-345.04 Composition of Concrete

Master Proportion Table

Concrete	Grade of Coarse Coarse Aggregate (*a)	Water Cement Ratio (lbs/lb) (*e)	Minimum Cement Factor Lbs per Cubic Yard of Concrete	Slump Range (inches)	
				Non-Vibrated Placing	Vibrated Placing
I	(*b)357 or 57	0.55	508	0-6	(*d)0-3½
II	57	(*f)0.49	564	3-5	0-3½
III	(*g) 57	0.50	611	(*c)7-9	0-3½
IV	(*g) 57	0.41	658	Not Applicable	0-3½

(*a) When requested by the Contractor and approved by the Engineer, Grade 7 aggregate may be used as a substitute for Grade 57, in any mix design for the concrete which is heavily reinforced, when shrinkage does not cause cracking and is not a detrimental factor in the function of the concrete element. Grade 89 coarse aggregate may be substituted in the design mix for concrete which is to be slip formed when requested by the Contractor and approved.

(*b) Grade 357 aggregate shall be used only in Class I concrete for use in concrete pavement.

(*c) Slump range is applicable only when used as seal concrete.

(*d) When the slip-form paver is used, the consistency of the concrete shall be such that there will be no slumping at the edge of the concrete after the forms have passed. Extreme care shall be taken to assume uniformity of the batches, with respect to materials, moisture content, consistency, and mixing time.

(*e) When Type III cement is used in non-vibrated mixtures, an increase in the maximum water

of 0.03 pound per pound of cement may be required. (Not applicable for Class IV concrete.)
The water/cement ratio shall be 0.44 per pound for bridge deck construction.

(*f) For counterweight concrete and non-vibrated concrete mixes, the maximum water/cement ratio shall be increased to 0.56 pound per pound.

(*g) Grade 67 coarse aggregate may be used in Class III and Class IV at the Contractor's option.

Actual Proportions to be Used

The Contractor will be required to designate the actual proportions to be used, in order to produce a concrete of the strength required as specified in 345.08.

Prior to mixing any concrete, the Contractor shall submit his design mix for approval, and only mixes approved by the Engineer shall be incorporated into the work.

W-345.05 Certification (For Ready-Mixed Concrete)

The manufacturer of concrete shall furnish to the Engineer with each batch of concrete before unloading at the site, a delivery ticket on which is printed, stamped or written, the following information:

- (1) Name of ready-mix batch plant.
- (2) Serial number of ticket.
- (3) Date and truck number.
- (4) Name of contractor.
- (5) Job number.
- (6) Specific class or designation of concrete.
- (7) Quantity of concrete (cubic Yards).
- (8) Time loaded, or of first mixing of cement and aggregates.
- (9) Water added by receiver of concrete (if any), and his initials.
- (10) Type and name of admixture, and amount of same.
- (11) Mixing time, or reading of revolution counter at beginning and end of mixing period.
- (12) Signature or initials of ready-mix representative.
- (13) Type and brand of cement.
- (14) Amount of cement.
- (15) Total water content by producer (or W/C ratio).
- (16) Maximum size of aggregate.
- (17) Weight of fine and of coarse aggregate.
- (18) Indication that all ingredients and mix proportions are certified as being previously approved.

W-345.06 Chloride Content

Chloride content for all concrete to be used for the construction of prestressed members for coastal salt water crossings and corrosive environments shall not exceed 0.40 pound of chloride per cubic yard of concrete. The chloride content shall be determined as the average of three tests on samples taken from the concrete. The range of results of the three tests shall not exceed 0.15 pound

of chloride per cubic yard of concrete for a valid determination of chloride content. When test results are outside the 0.15 pound of chloride per cubic yard allowable range, an additional three tests shall be run until the test results are within the required range. Samples may be obtained from representative concrete cylinders or cores tested for compressive strength. However, if the cylinders or cores have been exposed to a salt or corrosive environment, the outer one-inch surface shall be discarded.

Chloride content shall be determined by the Florida Department of Transportation Method for Determining Low-Levels of Chloride in Concrete and Raw Materials as outlined in FDOT Research Report No. 203 and FDOT Corrosion Report No. 78-1.

The frequency of chloride content determinations made in accordance with these specifications and approved procedures shall be as follows:

- (a) When the chloride content is 0.20 pound of chloride per cubic yard or less, subsequent tests shall be made on a frequency of not less than one for every 4 weeks of pouring as long as the test values remain at or below 0.20 pound of chloride per cubic yard.
- (b) When the chloride content is in the range from 0.20 to 0.30 pound of chloride per cubic yard, subsequent tests shall be made on a frequency of not less than one for every two weeks of pouring as long as test values remain at or below 0.30 pound of chloride per cubic yard.
- (c) When the chloride content is greater than 0.30 pound per cubic yard, subsequent chloride content tests shall be made at the same frequency that concrete test cylinders are made for strength determination.

For any case listed above, when the source of any component material for the concrete is changed or when the design mix is altered, a chloride content determination test shall be made immediately when the change is made.

Test results taken at the frequency provided above shall represent the amount of chloride per cubic yard in all members cast, subsequent to the immediate preceding test for determination of chloride content.

The Contractor shall determine the chloride content of the component concrete materials (excluding admixtures for concrete) and provide this information to the Engineer when he submits his mix design. Design mixes will not be approved when the sum of chloride content of component materials indicate that the concrete mix derived from those materials will have a chloride content exceeding 0.40 pound per cubic yard of concrete.

W-345.07 Admixtures

Air-entraining Admixtures

Air-entraining admixtures will be required in all paving concrete and in all structural concrete except counterweight concrete. The amount of air entrained shall be from three to six percent. Air entrainment shall be produced by the addition of the air-entraining admixture to the

mixing water, during batching. Air-entraining cement will not be permitted. The amount of the admixture to be used per batch shall be determined in the field by trial.

Retardants

Unless specifically shown otherwise in the plans or in the special provisions, the use of retardants for the various classes of concrete shall be as follows:

- (a) Classes I and II concrete may be used with or without a retardant.
- (b) For Classes III and IV concrete, a retardant is required.
- (c) A subaqueous retarding plasticizer shall be added to seal concrete. One-half pound per bag of cement shall be added for the concrete in the bottom one-half of the seal and one-quarter pound per bag of cement shall be added for the concrete in the top one-half of the seal. The type plasticizer shall be approved by the Engineer.

When retardant admixtures are used, they also shall be added with the mixing water.

High Range Water Reducer Admixtures

The Contractor may propose the use of approved High Range Water Reducer (HRWR) admixture either Type F or Type G. The proposal to use HRWR for precast items shall include a list of precast items for which it is proposed. The Contractor may also propose the use of HRWR for cast-in-place concrete. The proposal to use HRWR for cast-in-place concrete shall include a detailed listing of the uses (area, locations, elements, etc.) for which its use is proposed and the anticipated benefits to be derived from the use of HRWR in each instance.

Value Engineering credits or other price adjustments will not be considered for proposals to utilize HRWR in order to reduce the specified minimum cement requirements for the various classes of concrete.

The Contractor's proposal to use HRWR in concrete shall include the following:

- (a) A certification from the HRWR supplier that the HRWR admixture proposed meets the requirements of ASTM C 494, Type F or G. The certificate shall state that the one-year tests representing the admixture to be supplied have been performed by an independent laboratory approved by the Cement and Concrete Reference Laboratory and records of such tests will be furnished to the Engineer on request. The certification shall also include an additional statement from the HRWR supplier or an approved independent testing laboratory that the proposed HRWR admixture is compatible with all other admixtures to be included in the concrete design mix.
- (b) When HRWR admixture is proposed for use in the design mix, the Contractor shall propose for approval a target slump value with a target range value of $\pm 1\frac{1}{2}$ inches. The target slump shall not exceed $6\frac{1}{2}$ inches. All other control requirements and ranges, other than slump, contained in Section 345 shall remain unchanged.
- (c) Design mix approval request for each class of concrete for which HRWR is

proposed shall be submitted to the Engineer with all confirming data for approval. Confirming data shall include all details of the design mix ingredients, all required certificates from the supplier and independent testing laboratory and a certificate from the witnessing Engineer that the Contractor has demonstrated through production and placement of at least ten batches that concrete containing HRWR has been produced meeting all test requirements, that the HRWR concrete has been satisfactorily mixed in accordance with the Contractor's proposed methods and sequences, and that the concrete was acceptably placed, consolidated, and cured.

Before any design mix is approved by the Engineer, the Contractor shall demonstrate through production of at least ten (three cubic yard minimum size) batches of concrete containing the HRWR that his concrete plant can produce concrete consistently meeting specified slump, air content, and compressive strength requirements. Disposal, and the cost therefore, of concrete produced for demonstration purposes is a Contractor's obligation. Subject to approval of the Engineer, this concrete may be incorporated into unreinforced concrete items such as curb and gutter, sidewalk, gravity retaining walls, roadway concrete barrier walls, etc. The Contractor shall also demonstrate to the witnessing Engineer that the concrete containing the HRWR admixture in accordance with his proposed design mixes can be placed, consolidated, and finished under conditions existing for the proposed uses.

The design mixes shall each include descriptions of methods, sequences, times, and places that HRWR will be introduced into the concrete mix for each proposed use. Methods, sequences, times, and places for introduction for HRWR shall be adjusted to suit the requirements for each proposed use and condition. Design mixes including HRWR may be transferable based on demonstrated ability of the mix to perform its intended function.

Consideration of submitted design mixes for approval will begin when the Engineer has received certification from the witnessing Engineer that the Contractor has demonstrated that he can produce concrete containing HRWR admixture in conformance with his proposed design mixes meeting minimum strength requirements within specified ranges for slump and air and placed, consolidated, and finished under conditions existing for the uses proposed. In addition, the certification shall include the test values of the slump, air, and 28-day strength tests for all demonstration batches of concrete and an evaluation and description of the Contractor's actual sequences, methods, and time required for the placement and consolidation of each batch of concrete. The certification shall also include the witnessing Engineer's evaluation of the appearance, apparent consolidation, and finish texture after form removal of each item cast.

Except for casting unreinforced concrete items approved by the Engineer for demonstration, no concrete containing HRWR admixture shall be produced and placed for payment under contract pay items until design mixes containing HRWR have been approved. To qualify for payment under contract pay items, unreinforced demonstration concrete, cast with the approval of the Engineer, shall meet minimum strength and entrained air requirements contained in these specifications and the slump shall be within 1½ inches of the target slump proposed by the Contractor.

Types of Admixtures to be Used

The Contractor shall designate in advance the particular type and product of admixtures he proposed to use and only such admixtures as are approved by the Engineer shall be incorporated into the concrete. Admixtures designated by the Contractor shall be compatible to all other

components of the concrete.

W-345.08 Required Strength of Concrete

Except as may be modified in the plans or special provisions, the required minimum 28-day compressive strength for the various classes of concrete shall be as follows:

Class I	(*a)	2,500 psi
Class II.		3,400 psi
Class III	(*c)	5,000 psi
Class IV.	(*b)	3,400 psi

- (*a) When used for cement concrete sidewalks and pavement, for curb and gutter, valley or special gutter, median or other type curb, and for culvert headwalls and outfall structures, inlets, manholes, junction boxes or other minor drainage structures, Class I concrete shall have a minimum strength of 3,000 psi. This does not apply to concrete used for pipe encasement, collars, fill or ballast concrete or other concrete items where the plans specify or conditions justify a 2,500 psi mixture.
- (*b) When used for prestressed members, Class IV concrete shall have a minimum strength of 5,500 psi.
- (*c) No minimum strength is required when Class III concrete is used as seal concrete.

In the event that the proportions of the concrete mixture designated by the Contractor, in accordance with 345.04 above, do not produce concrete of the desired strength, the Contractor shall adjust the mix accordingly in order to obtain the required strength, and at no additional cost to the Engineer.

W-345.09 Concrete Failing to Meet Strength Requirements

For concrete which has been mixed and placed in accordance with these specifications, and which fails to meet the minimum 28-day strength requirements applicable to the particular class, the conditions under which such concrete may be accepted shall be determined as shown below.

- (a) Class I Concrete: Class I concrete having 28-day strength of less than the minimum required strength shall be removed and disposed of by the Contractor, at his expense, unless specifically authorized by the Engineer, in writing, to remain in place. The removal shall be in such manner as will not cause damage to the remaining concrete or to other structural units or other facilities and property.

The Engineer may, at his discretion, allow concrete which fails to meet the minimum strength requirement to remain in place. Payment for this concrete will be at a reduced price to compensate the Engineer for loss of durability. The amount of the reduction shall be determined by negotiation and shall be based on the particular circumstances.

- (b) Classes II, III, and IV Concrete: Classes II, III, and IV concrete which fails to meet the minimum strength requirements may be accepted at the discretion of the

Engineer, subject to the following provisions:

- (1) Generally these classes of concrete are used for structural applications where compressive strength is critical and is anticipated in the design. Where these classes of concrete are used in such installations, all such concrete failing to meet the minimum strength requirements shall be removed and disposed of by the Contractor at his expense, and removal shall be in the manner as specified for Class I concrete above.
- (2) Where these classes of concrete are used in structural elements for which the strength of the concrete is not critical and the structural integrity is not affected, the Engineer may, at his discretion, allow the concrete to remain in place. Payment for this concrete will be at a reduced price to compensate the Engineer for loss of durability. The amount of reduction shall be determined by negotiation and shall be based on the particular circumstances.

W-345.10 Test Requirements

The Contractor shall furnish to the Engineer sufficient concrete of the design mix as may be required to verify specification compliance. The Engineer will sample the fresh concrete and perform tests as required by these specifications at frequencies established in the Florida Department of Transportation's "Sampling, Testing and Reporting Guide" or as otherwise required. The Contractor shall furnish and maintain facilities suitable for curing concrete test specimens in compliance with the requirements of AASHTO T 23. The Contractor shall furnish and maintain power supplies and all equipment and materials necessary for proper operation and shall maintain the curing facilities throughout the curing periods.

A set of cylinders for determination of compressive strength shall consist of two individual cylinders. Additional cylinders may be made at the option of the Engineer for determination of concrete compressive strength at various ages. Specific requirements for sampling frequency for the purpose of determining strength of concrete shall be in accordance with the following:

- (a) A set of three (3) test cylinders shall be made for each class of concrete for each 50 cubic yards or fraction thereof placed each day, provided no extra cylinders will normally be required for less than 10 cubic yards of additional concrete.

TWO exceptions to the above requirement are:

- (1) When High Early Strength concrete is used or early form stripping is desired, a set of cylinders shall be four instead of three.
 - (2) Only one set of test cylinders will normally be required for each pour of seal cement.
- (b) One set of cylinders shall be made for each 4,000 square yards of paving concrete, or fraction thereof, placed each day.

Suitable field curing of test specimens may be accomplished by, but not limited to, tightly enclosing each specimen in a suitable polyethylene plastic bag, or by

covering the surface with an approved waterproofing spray material.

Tests for Strength of Concrete

The method of determining the strength of the concrete shall be in accordance with the following procedures:

Unless specifically stated to the contrary, compressive strength shall be based upon 28-day results. The compressive strength of the quantity of concrete placed and represented by one set of cylinders shall be determined as the average of the two cylinders comprising the set. If either of the test cylinders of a set of two shows evidence of improper sampling, molding, handling, curing or testing, the test result of the defective cylinder shall be discarded and the compressive strength of the concrete represented shall be determined from the test result of the remaining cylinder. Low strength shall not be a basis for discarding a cylinder test result.

If the 28-day cylinder test results indicate low strength concrete, the Contractor may elect to drill core samples from the actual concrete placed. If the Contractor elects to drill core samples from the hardened concrete, the costs of obtaining the cores and repairing the core holes shall be borne by him. The cores shall be drilled, as directed by the Engineer, at the same approximate locations from which the test cylinder was obtained. The location of the drilled cores shall be selected so that the remaining structure will not be impaired or sustain permanent damage after the core holes are repaired by the Contractor. When the Contractor elects to supply drilled core samples, two undamaged samples will be required. If the Contractor obtains cores following notification of failing strength in sufficient time for such cores to be tested by the Engineer prior to the lapse of a 42-day time limit, the 28-day strength of the concrete placed and represented by the drilled core samples shall be determined as the average of the test results of the two drilled cores. If, however, the Contractor delays in obtaining core samples for strength determination, they shall be acceptable to the Engineer for testing only when the Contractor submits a correlation curve developed by an approved independent testing laboratory to relate strength at the actual test age to 28-day strength for the particular class and design mix represented by the cores. When the Contractor elects to supply drilled cores and submits acceptable drilled cores to the Engineer for testing, both the Contractor and the Engineer shall accept the results of the tests of drilled cores in lieu of the results of the tests on the test cylinders.

Methods of Sampling and Testing

Test cylinders cast to determine acceptability for minimum strength requirements shall be made and cured in accordance with AASHTO T 23 and tested in accordance with AASHTO T 22. Test cylinders cast to determine when a precast unit or a structure may be put into service or to determine when a tensioning load may be transferred shall be cured by methods identical to those used in curing the concrete member, and tested in accordance with AASHTO T 22.

Drilled core samples shall be taken and tested in accordance with AASHTO T 24.

Test beams shall be made and cured in accordance with AASHTO T 23 and tested in accordance with AASHTO T 97.

Slump shall be determined in accordance with AASHTO T 119.

The amount of air entrained shall be determined by pressure or volumetric meters of approved design and in accordance with AASHTO Method T 152 or AASHTO Method T 196, except that AASHTO T 199 may be used as an indicator only. The Chase Air Indicator shall not be used for acceptance testing.

Concrete Cylinder Curing Box

The Contractor, at his option, may furnish a concrete cylinder curing box meeting the following requirements:

- (a) The curing box shall have suitable internal dimensions. The top of the curing box shall be a lid with hinges at the back and two securing latches capable of locking the curing box on the front of the lid. The free movements of the lid shall be restricted to no more than 100 degrees of rotation from the closed position by a chain attached between the lid and the body of the curing box.
- (b) All interior surfaces of the curing box shall be constructed of noncorroding materials. A moisture proof seal shall be provided between the lid and the body of the curing box.
- (c) Heat requirements of the curing box shall be supplied by an immersible electric heater (minimum 1,500 watts) located near the bottom of the curing box. Heater elements shall be located to provide free access to cleaning and adequate circulation of the surrounding water. A combination hose connection and drain shall be provided at the lower front edge of the curing box so that it may be drained or water may be circulated. A drain shall be provided on the rear face of the curing box in such a position that when open, it will allow water to drain to within one inch over the top of the cylinders.
- (d) A rack, constructed of noncorroding metallic material, set approximately four inches above the bottom of the curing box shall be provided to support the cylinders in an upright position. This rack shall be positioned to allow free circulation of water around the cylinders. Access for cleaning shall be provided to all parts of the curing box. The electrical utility connection shall be made in a lockable switch box that is securely attached to the side of the curing box.
- (e) A bimetallic thermometer shall be installed so that it will measure the internal temperature of the curing box, and can be read from the outside without opening the curing box. This thermometer shall have minimum graduations of 2°F and shall be protected from physical damage by suitable shielding.
- (f) The curing box shall be capable of maintaining an internal water temperature of 63.4°F, through an ambient air temperature range of -10°F to +100°F. When filled with water, the curing box shall not leak.
- (g) The curing box will be accepted for use based on the above criteria.

W-345.11 Care and Storage of Aggregates

Prevention of Contamination and Segregation

The handling and storage of concrete aggregates shall be in such manner as to minimize any segregation and to prevent contamination by foreign materials. When fine and coarse aggregates cannot be stored sufficiently remote from each other to prevent mixing, suitable baffles shall be provided which will prevent intermingling of the different aggregates.

Stockpiles

Whichever of the allowable methods of stockpiling aggregates, as specified below, is used by the Contractor or the concrete supplier, it shall be their responsibility to handle the aggregates in such manner as will minimize segregation and to recover material from the stockpile for use in the mix in such manner that it will fall within the limits of the specifications. The Contractor shall make available to the Engineer's personnel, for sampling, the necessary quantities of aggregate on the recovery side of the stockpile where feasible, for their testing at a frequency necessary to ensure compliance with the specifications.

Stockpiles, of either coarse or fine aggregates, shall be built up in layers not to exceed three feet in height, and each layer shall be completely in place before the next layer is started. Coning of stockpiles will not be permitted.

When trucks and bulldozers are used to form a ramp-type stockpile, such stockpiles shall be constructed in lifts not exceeding three feet in height and shall have a slope not to exceed thirty degrees. Generally, only rubber-tired equipment will be permitted on the stockpile. Equipment other than rubber-tired equipment may be permitted by the Engineer when the Contractor can show that the equipment produces no detrimental effect.

When the stockpile is formed by a belt conveyor system, the discharge end of the conveyor shall be adjustable in height and capable of moving circularly, or the Contractor shall provide means of preventing high coned piles which promote segregation.

When aggregates are stored in silos, the overhead discharge shall be so arranged that segregation of the aggregates does not occur. The silos shall be maintained in a reasonably full condition, as far as practicable.

Coarse aggregate stockpiles shall be maintained in a continuously wet condition during patching operation, such as to assume uniformity of concrete consistency.

W-345.12 Plant and Equipment

Equipment used for handling elements, mixing concrete, handling the mixed concrete, transporting concrete, and depositing concrete shall be constructed of materials which have no detrimental effects on the completed structure. These limitations refer only to the surfaces of equipment which are at any time in physical contact with the elements of concrete or the mixed product, up until the depositing of the concrete. Equipment surfaces which are in physical contact with the elements of concrete or the mixed product shall not be made of aluminum. These restrictions do not apply to equipment used in finishing the concrete or to handling equipment used to transport the element of concrete from source to the batch plant. In the event the Engineer determines that the completed structure has suffered damage growing out of the use of equipment

chosen by the Contractor, the repair or the replacement of the damaged portions of the structures shall be made at the Contractor's expense.

Safe and suitable facilities shall be provided for sampling cement and fly ash with a sampling tube or scoop from the storage silo, from the weighing hopper or from the feedline immediately before entering the hopper. The sampling port of plate shall be of size to accommodate a 1½-inch diameter sampling tube or a scoop and shall be equipped, where necessary, with a valve or flap which will prevent blow-back or spillage.

Measuring Devices

All materials shall be measured by approved measuring devices. Batch plants may include manual equipment, in which the operator sets batch weights and discharges materials manually; may be semi-automatic plants, in which batch weights are set manually and materials are discharged automatically; or may be fully automatic, electronically controlled plants, in which mixes are controlled by means of selectors or punch cards.

Where beam type scales are used, suitable means shall be provided to hold poises securely in position after they are set. Frequent inspection of the scale poises shall be made to ensure that they are properly set and secured. The batch plant shall be constructed in such a manner that wind will not affect the accuracy of the weighing of materials.

The batch plant shall be equipped with adequate hoppers to provide separate weighing of all aggregates and of cement.

Measuring Water

Water may be measured by volume or by weight. Whichever method is used, the equipment shall be so arranged that the accuracy of measurement will not be affected by variations in pressure in the water supply line. The weighing device shall be capable of being set to deliver the required quantity and to automatically cut off the flow when the quantity has been discharged. It shall have an accuracy, under all operating conditions, within one percent of the quantity of water required for the batch. Tests for accuracy of the device shall be performed by a commercial laboratory or other qualified testing agency as approved by the Engineer, and such tests shall be made prior to the beginning of the work and at least once each three months thereafter.

Devices for Measuring Admixtures

The batching equipment shall be provided with a sufficient number of approved measuring devices which will automatically dispense the required amounts of admixtures for each batch. The measuring devices shall be so arranged as to add each admixture separately in individual sequence during the time mixing water is added.

Dry admixtures shall be measured by weight and paste or liquid admixtures by weight or volume, within a limit of accuracy of three percent.

Measuring Bulk Cement

Bulk cement shall be batched by weight and shall be weighted separately from other materials. The scales may be of either the beam type or the springless-dial type, and shall be the product of a recognized scales manufacturer. The weigh beams, or dials, shall be graduated to permit reading to one tenth of one percent of the capacity of the scales. A device such as a springless-dial indicator or tare beam shall be provided to indicate to the operator that the required load in the hopper or container is being approached. The device shall indicate at least the last 50 pounds of load. After the cement is weighed, it shall be protected from loss in handling or in transit.

Measuring Fine and Coarse Aggregates

The weighing equipment for aggregates shall comply with the following requirements:

- (a) At least that part of the total load weighed which is a fraction of 100 pounds shall be indicated on a graduated beam or dial. The final reading shall be taken only when the scale beam is balanced.
- (b) The weighing equipment shall be so arranged that, when batching, the weighing beam or dial is in full view of the operator.
- (c) There shall be enough clearance at the top of the weighing hopper to permit the scales operator to shovel material from the weighing hopper.
- (d) Weighing hoppers on platform scales shall be mounted with the center of gravity of the loaded hopper vertically over the center of the scale platform.
- (e) Accurate and efficient operation of the scales shall be assured by frequent cleaning of such parts of the weighing equipment as may be required.

Accuracy of Scales

Prior to beginning any work, all scales and other measuring devices used in batching shall be checked for accuracy by a qualified representative of a scale company registered with the Bureau of Weights and Measures of the Florida Department of Agriculture.

Scales shall be rechecked once every three months or more often if deemed necessary. Scales shall be checked up to at least the maximum load normally handled on that scale.

Maintenance tolerances for cement scales, fly ash scales, or coarse and fine aggregate scales shall be checked up to at least the maximum load normally handled on that scale.

A certificate of inspection bearing the date of the certification and signed by the scale company representative shall be affixed to each measuring device. A copy of the scale company's report corresponding with the current certificate of inspection, showing the date of inspection; signature of the scale company representative; the observed scale deviations for the loads checked, and a statement that the scale conforms to Department of Transportation specifications and Chapter 531 of Florida Statutes shall be available at the plant.

W-345.13 Mixers

All mixers shall be of an approved type and shall be capable of combining the components of the concrete into a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity.

Mixers may be of the rotary type or the turbine type and may be mobile (truck mixers) or stationary (central mix), except that mixers for concrete paving when the concrete is mixed on the roadway shall be dual-drum type, equipped with a fully power-controlled boom-and-bucket which shall be so operated that the batches will be uniformly distributed on the subgrade.

A copy of the manufacturer's design, showing dimensions and arrangement of blades shall be available at the plant at all times. The use of mixers that have been altered from such design in respect to blade design and arrangement, or to drum volume, may be permitted when recommended by the manufacturer and approved by the Engineer.

Each mixer shall have attached by the manufacturer, a metal plate, or plates, on which are plainly marked the various uses for which the unit is designed. The data shall include the agitating and mixing capacity of the unit, the speed of rotation of the drum, and the serial number of the unit.

When mixers are equipped with skips, the skip shall be provided with a barrier to prevent dirt, mud, and other extraneous material entering the mix from truck tires.

Special Requirements for Central Mixing

When central-plant mixing is used for the entire mixing of concrete which is to be transported as wet batches, the mixing time shall be not less than 60 seconds.

If necessary in order to produce a homogeneous mixture, the minimum allowable mixing time specified above may be increased.

The mixer shall be operated at the drum speed stipulated on the manufacturer's nameplate on the mixer.

Truck Mixers

The drum of truck mixers may be actuated by a power source independent of the truck engine or by a suitable power take-off. Either system used shall provide control of the rotation of the drum within the limits specified on the manufacturer's nameplate, regardless of the speed of the truck. Truck mixers of the revolving-drum type shall be equipped with a hatch in the periphery of the drum which permits ready access to the inside of the drum for inspection, cleaning, and repair of blades.

Truck mixers shall be equipped with revolution counters of approved type and mounting, by which the number of revolutions of the drum may be readily verified. (The counters shall be actuated only after the mixing speed has been reached.) The water supply system mounted on truck mixers shall be equipped with a volumetric water gauge, in operating condition.

Timing Devices and Batch Meters

Both stationary and boom-and-bucket type mixers shall be equipped with an approved

timing device which will automatically lock the discharge lever when the drum is charged and release it at the end of the mixing period. In the event of failure of the timing device, the Engineer may allow operations to continue, under his direct supervision, as may be necessary to avoid critical or uneconomical conditions, but not to extend beyond the end of that working day.

A batch meter or other satisfactory device for accurately recording the number of revolutions for each batch shall be attached.

Volume of Material Mixed

For boom-and-bucket type mixers, the volume of the material in a batch shall not exceed by more than ten percent, the mixer's capacity in cubic feet as shown on the standard rating plate on the machine. For all other types of mixers, the volume of material mixed per batch shall not exceed the manufacturer's rated capacity of the drum.

Maintenance of Mixers

All mixers shall be examined by the Contractor or supplier at least once each week for changes due to accumulation of hardened concrete or to wear of blades. The blades shall be replaced when any part or section is worn as much as one inch below the manufacturer's original design height and any appreciable accumulation of hardened concrete shall be removed before any mixer may be used under these specifications.

W-345.14 Mixing Concrete

No concrete shall be mixed when the atmospheric temperature is below 40°F except as provided herein.

The Contractor shall assume all risk when placing concrete under extreme weather conditions, and permission to place concrete will in no way relieve the Contractor of the responsibility for satisfactory results.

Only the amount of concrete required for immediate use shall be mixed, and any concrete which has developed initial set shall be discarded. Retempering of concrete will not be permitted.

Adjustment to mix consistency, within the allowable limit for the addition of water at the job site, shall be made upon initial arrival at the job site and not thereafter. The consistency of concrete and adjustments thereto, shall be a Contractor's responsibility; however, the specified water/cementitious ratio on the approved mix design for each class of concrete shall not be exceeded.

When water is added at the job site, the concrete shall be mixed 30 additional mixing revolutions. All mixing shall be completed before the total revolutions at mixing speed exceed 150.

All concrete shall be mixed a minimum of sixty seconds after all materials are in the drum, unless a reduced mixing time is authorized by written permission, except that when truck mixers are used, each batch shall be mixed not less than 75 nor more than 100 revolutions of the drum, at a rate of not less than 8 r.p.m. nor more than the maximum r.p.m. specified by the manufacturer. Any further mixing shall be at agitator speed unless it is necessary either to adjust the consistency of the

mix or in order to achieve uniform mixing, which in either case the Engineer may require a longer mixing period. The mixing drum speed of all type mixers shall be that recommended on the manufacturer's nameplate and any further agitation required prior to discharge shall be at the agitator speed recommended on the manufacturer's nameplate.

Cleaning Mixer

The entire contents of the mixer shall be removed from the drum before the materials for the succeeding batch are placed therein. The skip and throat of the drum shall be kept free of accumulations. Upon the cessation of mixing for a considerable length of time, the mixer shall be flushed with water and thoroughly cleaned.

Charging the Mixer

Each batch shall be so charged into the drum that some water will enter both in advance and after the cement and aggregates, as well as during the charging of the cement and aggregates. If fly ash is used in the mix, it shall be charged into the drum over approximately the same interval as the cement.

Mixing at the Site

Concrete mixing at the job site shall be by a mixer of sufficient capacity to prevent delays that may be detrimental to the quality of the work. The batching equipment shall be in accordance with the requirements of this section.

Mixing for Concreting in Cold Weather

When the atmospheric temperature is such that concreting in cold weather procedures are required, the temperature of the concrete shall be controlled by heating the aggregates and water to a temperature of at least 70°F but not more than 150°F. The aggregates may be heated by either steam or dry heat. The Contractor shall supply such heating apparatus as stoves, salamanders, or steam equipment and the necessary fuel. The apparatus used to heat the aggregate shall be capable of heating the materials uniformly. When dry heat is used, a means of maintaining atmospheric moisture shall be provided. The aggregate shall not be heated directly by gas or oil flame or on sheet metal over a fire. When approved, the torch method of heating mixed concrete may be used provided the heating apparatus is capable of heating the mass uniformly and no hot spots will occur which will burn the materials. The use of steam on or through binned aggregates will not be permitted.

Mixing for Concreting in Hot Weather

When hot weather concreting procedures are required to control the concrete temperature at the point of placement, the Contractor shall submit for review and approval his proposed methods of control which will be applied at the concrete batch plant.

W-345.15 Transportation Equipment

Wheelbarrows will be permitted for transporting aggregates to the mixer only when a two-bag or other small type mixer is used.

When dry batches are transported to the mixer, the truck bodies shall be divided into compartments of sufficient size to contain all materials and prevent spilling from compartment to compartment and shall carry suitable covers for protection against inclement weather when necessary. The cement container shall be of a box type that will prevent loss, keep out moisture, dump clean and hold its shape. It shall be of sufficient size to hold the required amount of cement without spilling and shall have a waterproof cover. Truck compartmentation shall be approved prior to use.

Wet batches of concrete may be transported in either agitating or nonagitating trucks. Bodies of nonagitating trucks shall be smooth, mortartight metal containers with round internal corners and shall be capable of discharging the concrete at a satisfactory controlled rate without segregation. Covers shall be provided when needed for protection.

When nonagitator trucks are used, the elapsed time between the addition of water to the mix and depositing the concrete in place shall not exceed 45 minutes, except that when a retardant admixture is used, such elapsed time shall not exceed 75 minutes. When the hauling is done in truck agitators, such elapsed time shall not exceed 60 minutes, except that when a retardant admixture is used, a maximum elapsed time of 90 minutes will be permitted.

* * *

SECTION 550 - FENCING, TYPE B, VINYL COATED

W-550.01 General

The work specified in this section consists of furnishing and erecting metal fencing, Type B at the locations shown in the plans, as specified, and directed by the Engineer.

The Contractor may elect to use a combination of zinc-coated steel fence members, aluminum coated fence members, and aluminum alloy fence members. All fabric shall be coated with black, Type IV vinyl. Unless otherwise called for in the plans, only one line post optional material and only one pull assembly optional material will be permitted between corner and end post assemblies.

W-550.02 Installation

The fence installation shall be in accordance with these specifications and with the details shown in the plans. The fence will be constructed in close proximity to the right-of-way line except as may be detailed otherwise in the plans. The Contractor shall be responsible for obtaining satisfactory permits or permission from property owners for any encroachments required to perform the work, and for proper scheduling of the fence installation with the removal of existing fences where it is necessary to provide continuous security to adjacent areas already fenced. In order to meet these requirements, where necessary or maintaining security of livestock on any property during construction of the new fence, the Contractor shall install and subsequently remove temporary fencing.

Posts shall be spaced as shown in the plans, within a tolerance of 12 inches, except where definite spotting of corner posts is required in any line of fence; however, the over-spacings and the under-spacings shall approximately compensate. Additional line posts shall be set at abrupt changes in grade.

W-550.03 Clearing

Where the clearing and grubbing for the project does not include the area occupied by the fence, clearing shall be done to a width of at least two feet on each side of the fence line, except that the Engineer may direct that valuable trees be left in place. Such clearing shall not extend beyond the right-of-way line.

W-550.04 Construction Over Irregular Terrain and Other Obstructions

The bottom of the fence shall, in general, follow the contour of the ground. Over irregular ground, however, a minimum clearance of one inch and a maximum of six inches will be permitted for a length not to exceed eight feet.

Where necessary to secure proper vertical alignment and to meet the clearance requirements specified above, depressions shall be substantially filled (except where filling would obstruct property drainage) and knolls and ridges cut down; all in such manner as to provide a substantial and permanent foundation for the fence.

At locations where it is impractical to adjust the ground level, the Engineer may require that posts of

additional length be set and that the opening at the bottom be closed by additional fabric, stretched taut between poles. For all such posts requiring a concrete base, the concrete shall be extended downward to the bottom of the extra-length post.

If rock occurs within the required depth of the post hole or pavement which is to remain in place exists at the location of a post, a hole of a diameter slightly larger than the greatest dimension of the post or footing shall be drilled and the post or footing grouted in.

W-550.05 Placement of Fabric

Fabric shall not be placed until the posts have been permanently positioned and concrete foundations have attained adequate strength. The fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making permanent attachments at intermediate points. The fabric shall be fastened to all end, corner, and pull posts by substantial and approved means. Fastening shall be done by use of tools designed for the purpose, in accordance with manufacturer's recommendations. The tension for stretching shall be applied by mechanical fence stretchers or with single-wire stretchers designed for the purpose. All splices in the fabric shall be securely and neatly made.

W-550.06 Electrical Grounding

Whenever a power line passes over the fence, a ground shall be installed directly below the point of crossing. The ground rod shall consist of an aluminum or galvanized rod, with connection of similar metal if required, or of other appropriate material, eight feet in length and at least 5/8 inch in diameter. The rod shall be driven vertically until the top of the rod is approximately six inches below the ground surface. A No. 6 conductor shall be used to connect the rod and all fence elements. The conductor shall be connected to each fence element and the ground rod by means of electrical-type clamps which will prevent corrosion.

W-550.07 Metal Fencing Materials

The fabric, posts, fastenings, fittings, and other accessories for chain-link fence shall meet the requirements of AASHTO M 181 with the following changes: (1) The weight of coating of coated wire fabric shall be 1.8 ounces of zinc per square foot (Class B). (2) The galvanizing of steel materials shall be done after fabrication. (3) Black, Type IV Vinyl Coated Fabric shall be used.

Overall dimensions of the fabric, posts, and other elements of the fence and other dimensions of the various elements, shall be in accordance with the Roadway and Traffic Design Standards, unless otherwise shown in the plans.

The fencing shall have a "top rail" in lieu of a tension wire.

W-550.08 Steel Posts and Braces

All steel corner, end, pull posts, top rails, and braces for Type B fence shall be tubular and shall meet the requirements of Table X2 of ASTM A 53, for Standard Weight Pipe (Schedule 40), except for test pressure requirements. The posts rail and braces shall be zinc-coated at the rate of 1.8

ounces per square foot, inside and out, to meet the requirements of ASSHTO M 111. Steel line posts shall be tubular, "C," or H-Beam at the option of the Contractor. Steel "C" or H-Beam posts shall be zinc-coated at the rate of 1.8 ounces per square foot.

Post caps, designed to provide a drive fit over the top of the tubular post to exclude moisture, shall be provided.

Line posts which are to be set in a concrete base shall meet the material specifications as specified herein.

Line posts which are to be driven shall be steel only and be one of the following types: (1) Meet the specifications for steel corner, end, or pull posts as specified in herein. (2) Be made of ASTM A 569 steel and have a 12-inch nominal diameter with a minimum 50,000 psi tensile strength. (3) A galvanized steel H-Beam – 1 ϕ inches by 1 ϵ inches. (4) A galvanized steel "C" section - 1 ϕ inches by 1 ϵ inches.

Other accessories shall be stretcher bars and truss rods.

W-550.09 Aluminum Posts and Braces

Aluminum corner, end, pull posts, top rails, and braces shall be tubular, Schedule 40, of the dimensions required by the F.D.O.T. Roadway and Traffic Design Standards, unless otherwise shown in the plans. Aluminum line posts shall be tubular or H-Beam at the option of the Contractor.

Post caps, designed to provide a drive fit over the top of the tubular post to exclude moisture, shall be provided.

The Contractor shall submit to the Engineer certified copies of the manufacturer's chemical and physical tests of the aluminum.

W-550.10 Optional Materials

Resistance welded coated steel tubing may be used for posts. The tubing shall be cold rolled from ASTM A 569 or A 607 strip, hot dipped galvanized to 1.0 ounce per square foot (0.8 ounce per square foot at any point), with a chromate conversion coating and a thermoplastic acrylic or polyester top-coat of 0.3 mil minimum dry thickness. The internal surfaces shall be coated with zinc rich coating (80 percent minimum zinc dust) to a dry thickness of 0.3 mil minimum. The steel tubing may also be hot dipped galvanized to meet the requirements of ASTM A 120 with a zinc weight of 1.8 ounces per square foot minimum both inside and outside the pipe.

Corner and pull posts shall be two-inch nominal diameter (2.375 inches OD + 0.130-inch minimum wall thickness, 3.11 pounds per lineal foot minimum weight.

Line posts shall be 12-inch nominal diameter (1.900 inches O.D. + 1/64, - 1/32), 0.120-inch minimum wall thickness, 2.28 pounds per lineal foot minimum weight.

Top rail and brace shall be 13-inch nominal diameter (1.660 inches O.D. + 1/64, - 1/32), 0.111-inch minimum wall thickness, 1.83 pounds per lineal foot minimum weight.

Aluminum coated steel tubing may be used for posts. The coating weight shall be a minimum of 0.4 ounce per square foot and the tubing shall be coated both inside and outside. The steel shall have a minimum yield strength of 50,000 psi. Dimensions shall be as specified for resistance welded coated steel tubing.

* * *

SECTION 16216

DIESEL ENGINE DRIVEN GENERATOR WITH WEATHERPROOF ENCLOSURE

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all materials, equipment and incidentals required to delivery, and field test the weatherproof diesel engine driven generator unit, automatic transfer switch, and appurtenances as shown on the Drawings and specified herein.
- B. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, and delivery and field testing, of required generator and appurtenances for the complete unit as herein specified, whether specifically mentioned in these Specifications or not.
- C. The Generator Supplier is responsible for field testing of the entire installation and instruction of the regular operating personnel in the care, operation and maintenance of all equipment.

1.02 DESCRIPTION OF SYSTEM

- A. The engine-generator sets shall be mounted as shown on the Drawings and shall be arranged for automatic starting and stopping, and load transfer upon failure of the normal source of power. The unit controls shall provide for automatic exercising on a weekly basis.

1.03 QUALIFICATIONS

- A. The generator sets shall be listed to UL 2200.
- B. The basis of the design shall be from Caterpillar Corporation, model C4.4 diesel generator, 100kW/125kVA. The unit shall operate at 480V, 0.8 power factor. The enclosure and fuel tank shall be by Phoenix Products. Cummins, Kohler, and Generac will be considered as approved equals. Approved equals must meet all specification requirements herein.
- C. Automatic Transfer Switch shall be Eaton or approved equal, UL 1008 Listed, Service Entrance Rated, Molded Case Circuit Breaker Type, 200 amp, 480 volt, 3 pole, ATC-900 controller, with stainless steel enclosure.

1.04 SUBMITTALS

- A. Submittals shall include test certification and specification sheets showing all

standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required for interconnection between the generator set and the transfer switch included elsewhere in these specifications.

1. Submit to the Engineer operating and maintenance data.
2. Submit to the Engineer the equipment MANUFACTURER'S Certificate of Proper Installation, Testing, and Instruction.
3. Submit to the Engineer the written warranty as required below.

PART 2 - PRODUCTS

2.01 RATINGS

- A. The standby rating of the generator sets shall not exceed the MANUFACTURER's published prime rating by more than 10%. The gross engine horsepower required to produce the standby ratings shall not exceed the MANUFACTURER's published continuous duty rating by more than 150 percent. Continuous duty rating shall be as defined in BS649 or DIN6270 but in no case shall it exceed the MANUFACTURER's published continuous duty rating for the engines as used in continuous rated pump drive applications. The gross engine horsepower required for the generator set standby ratings described above shall include all parasitic demands such as generator inefficiencies, fuel pumps, water pumps, radiator fan (for fan cooled models) and all accessories necessary to the unit's proper operation while operating at rated load and at a rotative speed not to exceed 1800 rpm.

2.02 ENGINES

- A. The engine shall be full compression ignition, four cycle, single acting, solid injection engine, either vertical or "V" type. Speed shall not exceed 1800 revolutions per minute at normal full load operation. Multi block engines are not allowed. The engine governor shall be electronic type with a +/- 0.5 percent accuracy.
- B. The engine shall be capable of satisfactory performance on No. 2 fuel oil (ASTM Designation D396). Diesel engines requiring a premium fuel will not be considered.
- C. The engine shall be capable of operating at light loads for extended periods of time and shall provide a means to reduce carbonization. Periodic cleaning of exhaust ports shall not be required.
- D. The engine shall be equipped with fuel filters, lube oil filters, intake air filters, lube oil cooler, fuel transfer pump, fuel priming pump, service meter, engine driven water pump, and unit mounted instruments. Unit mounted instruments shall include a fuel pressure gauge, water temperature gauge, and lubrication oil pressure gauge. The engine shall be provided with low oil pressure, high water temperature, low coolant level and overspeed safety shutdowns of the manual reset type. Additional instruments and safety shutdowns shall be provided as noted herein.

- E. Injection pumps and injection valves shall be a type not requiring adjustment in service and shall be of a design allowing quick replacement by ordinary mechanics without special diesel experience. The engine shall have an individual mechanical injection pump and injection valve for each cylinder, any one of which may be removed and replaced from parts stock. Fuel injection pumps shall be positive action, constant-stroke pumps, activated by a cam driven by gears from the engine crankshaft. Fuel lines between injection pumps and valves shall be of heavy seamless tubing.
- F. The fuel system shall be equipped with fuel filters having replaceable elements. Filter elements shall be easily removable from their housing for replacing without breaking any fuel line connections, or disturbing the fuel pump, or any other part of the engine. All fuel filters shall be conveniently located in one accessible housing, ahead of the injection pumps so that the fuel will have been thoroughly filtered before it reaches the pump. No screens or filters requiring cleaning or replacement shall be used in the injection pump or injection valve assemblies. The engine shall be equipped with a built-in gear-type, engine-driven fuel transfer pump, capable of supplying fuel through the filters to the injection pump at constant pressure.
- G. In addition to the standard fuel filters provided by the engine MANUFACTURER, there shall also be installed a primary fuel filter and a water separator in the fuel inlet line to the engine.
- H. The engine shall be provided with removable wet-type cylinder liners of close grained alloy iron, heat treated for proper hardness as required for maximum liner life. The cylinder block shall be a one piece stress relieved gray iron casting.
- I. The engine shall have a gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, valve rocker mechanism and governor. Effective lubricating oil filters shall be provided and so located and connected that all oil being circulated is continuously filtered and cleaned. Filters shall be accessible, easily removed and cleaned and shall be equipped with a spring-loaded by-pass valve as an insurance against stopping of lubricating oil circulation in the event the filters become clogged. The engines shall have a suitable water cooled lubricating oil cooler.
- J. The engine shall be provided with one or more engine mounted dry type air cleaners of sufficient capacity to protect effectively the working parts of the engine from dust and grit.
- K. During the initial start of the engine, a system shall be provided to pre-lube at low idle speed. When the internal oil pressure reaches a predetermined safe value, the engine will then increase to generator set operation speed.
- L. Mounting: The unit shall be mounted on a structural steel sub-base and shall be provided with vibration isolators.
- M. The engine shall be EPA Tier 2 certified.

2.03 COOLING SYSTEMS

- A. The engine shall be furnished with a unit mounted radiator-type cooling system having sufficient capacity for cooling the engine when the diesel generator set is delivering full rated load in an ambient temperature not to exceed 110 degrees F. The engines shall be provided with a thermostatic valve placed in the jacket water outlet between the engine and the cooling source. This valve shall maintain the proper jacket water temperature under all load conditions. Total air restriction from the radiator shall not exceed 0.5 inches of water at both inlet and outlet. A flexible connecting section shall be provided between the radiator and discharge louver frame.
- B. Closed circuit jacket water system shall be treated with a rust inhibitor as recommended by the engine MANUFACTURER.
- C. The expansion tank of the radiator shall be fitted with a low water level switch and wired into the safety shutdown system of the unit.

2.04 GENERATOR, EXCITER AND ACCESSORIES

- A. Rating: The generator's KW ratings shall be as indicated in these specifications, 0.8 p.f., 1800 RPM, 3 phase, 4-wire, 60 Hertz, 480 volts, 12 leads, with a maximum temperature rise of 130 degrees C (both armature and field) by resistance at full rated load in ambient air of 40 degrees C. The generator shall conform to NEMA Standard MG-1.
- B. Performance: The instantaneous voltage dip shall not exceed 15 percent of rated voltage when any load is applied. Recovery of stable operation shall occur within 5 seconds. Steady state modulation shall not exceed + ½ percent.
- C. Construction:
 - 1. The generator and exciter shall be dripproof, with split sleeve, or ball race bearings. A shaft-mounted brushless exciter shall be a part of the assembly. The stator cores shall be built up of high grade silicon steel laminations precision punched, and individually insulated. Armature lamination followers and frame ribs shall be welded integral with the frames for support of the stator core. A directional blower shall be mounted on the unit to draw cooling air from the exciter and over the rotor poles and through louvered openings on the opposite end.
 - 2. The exciter shall be a shaft driven PMG pilot exciter feeding the main's exciter, fast response type, with a rotating 3-phase full-wave bridge. The exciters shall have a low time constant and large capacity to minimize voltage transients under severe load changes.
 - 3. The alternator shall be salient-pole, brushless, 12-lead reconnectable, self-ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the

NEMA standard (MG1-33.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotors and stators shall be limited to 130° C. The excitation systems shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/- 0.25% at any constant load from 0% to 100% of rating. The regulators must be isolated to prevent tracking when connected to SCR loads, and provide individual adjustments for voltage range, stability and volts-per-hertz operations; and be protected from the environment by conformal coating.

4. Generator rotor poles shall be built up of individually insulated silicon steel punchings. Poles shall be wound and bonded with high strength epoxy resin. Cage connections to the amortisseur rings shall be brazed for strong construction and permanent electrical characteristics. Each pole shall be securely bolted to the rotor shaft with bolts sized for the centrifugal forces on the rotor. Generator windings shall be braced for full line to ground fault currents, with solidly grounded neutral system.

D. Accessories and Attachments

1. Low Voltage Terminal Boxes: The generators shall have separate AC and DC low voltage terminal boxes with suitably numbered terminal strip for required connections.
2. Engine Water Heater: Thermostatically controlled and sized to maintain the manufacturer's recommended engine coolant temperature to meet start-up requirements of NFPA-99 and NFPA-110, Level 1. Power supply shall be 120 volts single phase.
3. Alternator Heater: Sized to prevent the accumulation of moisture or dampness in the alternator windings. Power supply shall be 120 volts single phase.

E. Generator Associated Controls:

1. Voltage Regulator:
 - i) The generator MANUFACTURER shall furnish a hermetically sealed, silicon controlled rectifier type voltage regulator employing a zener reference with a +1 percent regulation for the generator. The regulators shall include 3-phase voltage sensing, automatic short circuit protection and shall include automatic underfrequency protection to allow the generator to operate at no load at less than synchronous speed for engine start-up and shutdown procedures. Switches and/or fuses shall not be used to provide this protection. An over-voltage sensing module with manual reset shall be furnished with the regulator. A volts per Hz., sensing module shall be provided as part of the regulation system.

- ii) A voltage adjustment rheostat for 5 percent voltage adjustment on the unit shall be provided.
 - iii) High voltage step-down potential transformers shall be provided for the voltage regulator power input and sensing circuits if required.
2. Sustained Short Circuit: A permanent magnetic exciter shall be provided on the unit for sustaining a current of 300 percent during a short circuit, permitting the generator breaker to trip on overload.

2.05 SOUND ATTENUATED, WEATHER-PROTECTIVE ENCLOSURES

- A. Enclosure shall be manufactured by Phoenix Products of Jacksonville, Florida.
- B. The intent of this Specification is to provide the generator system with sound attenuated, weatherproof type generator set enclosures complete in every detail and requiring no additional in-field modifications or assembly, except where specifically allows by these Specifications. The enclosure is to be accurately dimensioned so as to be in compliance with the National Electrical Code (NEC), and the National Fire Protection Association (NFPA) for clearance of all specified items included therein, and all applicable fire codes for a structure and application of this type.
- C. The enclosure shall conform to the following construction and design criteria shown on the Structural Drawings. The enclosure shall be designed for the wind loads listed below. Enclosure manufacturer to submit to the Engineer structural drawings and a certification signed and sealed by a Professional Engineer registered in the State of Florida stating that the enclosure is rated to withstand these wind loads.

Wind Loads:

Ultimate Wind Velocity, V_{ULT}	151 MPH
Nominal Wind Velocity, V_{ASD}	117 MPH
Exposure Category	C
Risk Category	III

- D. Enclosure shall also include Florida Department of Community Affairs Modular Building Insignia
- E. Enclosure shall consist of a roof, two (2) sidewalls, two (2) end walls, and be manufactured of formed aluminum components. The enclosure is to be provided with a means for securely attaching the entire structure to the base/fuel tank as specified within.

- F. Roof, sidewalls and end walls shall be of formed 0.125 marine grade aluminum. The roof is to be bolted to both side and end walls to form a complete weather and wind resistance assembly.
- G. Wall framing shall be incorporated in the panels by forming an open back box structure. Skin material shall be minimum thickness .080" 3003 grade aluminum. Enclosure shall have a baked on powder-coat finish for maximum corrosion resistance. Exterior skin panels shall be integral to the wall structure and not separate pieces riveted onto framing members. Wall panels shall be no wider than 36" each and shall be removable without the use of special tools. Wall and roof panels shall be designed so that field replacement can be accomplished without disassembly of the entire structure if damage should occur.
- H. Standard enclosure exterior color is white.
- I. Roof assembly shall be cambered to aid in rainwater runoff. Roofs with thicknesses of less than 0.125" nominally shall not be considered. Roof applications assemblies are to be mechanically fastened to the vertical wall sections. Glued or crimped roofs shall not be allowed nor considered as an acceptable alternative.
- J. Air handling shall be as follows: Air will enter the enclosure through a Hood, Plenum or Sound Attenuated Louvers/Baffles, as determined by the specific application and shall allow for the airflow demand for proper cooling to generator set package. The cooling air Inlet system shall prevent water intrusion into the enclosure with the generator set operating at full rated load while allowing for a maximum air restriction of less than 0.30" H₂O. Radiator Discharge shall be through a gravity operated extruded aluminum backdraft type damper and into a vertical discharge plenum or hood. Discharge plenum/hood shall discharge air upward and be provided with a means to positively drain any and all water entering the discharge device. Air discharge devices shall in no event restrict airflow by more than 0.25" H₂O. To ensure adequate airflow for cooling and combustion the static restriction over the entire system shall not exceed 0.50" H₂O. Both Intake and Discharge hoods and plenums shall be provided with removable bird/rodent screening to prevent the entrance of debris, birds, rodents and other vermin.
- K. All interior sidewalls shall contain non-asbestos thermal acoustic insulation with fire retardant properties. The insulation shall be completely covered by mill finish 0.050" perforated aluminum lining secured to the enclosure interior.
- L. Four-point lifting provisions shall be provided and have sufficient capacity suitable for rigging the entire Enclosure assembly.
- M. A minimum of two (2) single access doors shall be provided. Doors shall be manufactured of the same material as enclosure. Doors shall be fully gasketed to form a weather tight perimeter seal. Door hinges shall be full length stainless steel piano type and shall be attached with stainless steel hardware. Door handles shall be of a corrosion resistant material and shall provide for a lockable, secure entry point into the enclosure. Doors shall be insulated with no less insulation than is provided in the enclosure walls for sound attenuation.
- N. Enclosure manufacturer shall provide all necessary hardware to internally mount

the exhaust silencer(s) specified herein. Silencer mounting hardware shall maintain the weatherproof integrity of the enclosure system. If the silencer is mounted internally it should discharge upward into the radiator discharge plenum or hood where possible, otherwise the enclosure manufacturer shall provide an aluminum rain collar and rain dress shield. Rain Collar and Dress Shield shall be manufactured of aluminum or stainless steel and designed as a circular fabricated part that does not require hole indexing by the installing contractor during site installation

- O. As a minimum the enclosure shall provide an average 42db(A) sound reduction as measured at one meter, five feet above grade level under free field conditions to allow for a maximum of 75db(A) at 5 meters from the enclosure.
- P. Electrical Package:
 - 1. (4) LED Lights in Vapor Proof Fixtures. Lights shall be controlled by Switches Located at each of the doors.
 - 2. Engine Jacket Water Heater
 - 3. Alternator Space Heater
 - 4. Engine Starting Battery Charger
 - 5. Emergency Stop Pushbutton: Provide a NEMA 4X SS, Red, Mushroom-head emergency pushbutton that will immediately stop the generator upon activation. Provide a placard above the pushbutton to read "Generator Emergency Shut Down". Refer to drawings for pushbutton and placard location and details.
 - 6. Prewired mini power zone for all electrical components. Provide panel schedule and electrical load calculations for sizing of mini power zone.
- Q. Provide an aluminum platform and stair assembly to access all doors on the generator enclosure as shown in the drawings. Platform and stairs shall comply to the latest edition of the Florida Building Code. Refer to structural drawings for loading requirements.

2.06 EXHAUST SYSTEMS

- A. Exhaust Silencers - A critical type, side inlet, end outlet, Miratech or equivalent silencer and a flexible stainless steel exhaust fitting properly sized shall be furnished and installed at the time of manufacture of the Generator system The silencers shall be mounted so that its weight is not supported by the engine nor will exhaust system growth due to thermal expansion be imposed on the engine. Exhaust pipe size shall be sufficient to ensure that exhaust back pressure does not exceed the maximum limitations specified by the engine MANUFACTURER. So called "spiral" or truck mufflers are disallowed and will not be considered as equal to the industrial quality silencers specified above.
- B. The silencers shall be fitted with a tail pipe extension and rain cap to prevent the

entrance of rainwater.

- C. Rain Skirt - At the point where the exhaust pipe flexible tubing penetrates the roof of the enclosure, a suitable "rain skirt" and collar shall be provided by the MANUFACTURER.
It shall be designed to prevent the entrance of rain and allow for expansion and vibration of the exhaust piping without chafing or stress to the exhaust system. This detail must appear on the drawings submitted for approval.

2.07 AUTOMATIC STARTING SYSTEM

- A. Starting Motor - A DC electric starting system with positive engagement shall be furnished. The motor voltage shall be 12 volts.
- B. Automatic Control - Fully automatic engine start-stop controls in the generator control panels shall be provided. Controls shall provide shutdown for low oil pressure, high water temperature, overspeed, overcrank, and loss of engine coolant. Alarms for approaching high water temperature and impending low oil pressure shall also be included. Controls shall include a 30-second single cranking cycle limit with lockout or a cyclic crank system with lockout and overcrank protection.
- C. Batteries - A lead-acid storage battery set of the heavy duty diesel starting type shall be provided. Battery voltage shall be 12 volts, and the battery set shall be rated no less than 90 ampere hours. Necessary cables and clamps shall be provided.
- D. Battery Trays - battery trays shall be provided for the batteries and shall conform to NEC 480-7(b). It shall be constructed of fiberglass and so treated as to be resistant to deterioration by battery electrolyte. Further, construction shall be such that any spillage or boil-over of battery electrolyte shall be contained within the tray to prevent a direct path to ground.
- E. Battery Chargers - A current-limiting, automatic 12 volt DC charger shall be furnished to automatically recharge batteries. Charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, DC ammeter, DC voltmeter, and fused AC input. AC input voltage shall be 120 volts, single phase. Amperage output shall be no less than ten (10) amperes. Chargers shall be wall mounting type in NEMA 1 enclosure, and U.L. listed as an industrial control panel. The chargers shall be as manufactured by SENS per NFPA 110 and U.L. 508. The chargers shall be mounted and wired within the enclosure for the generator set by enclosure manufacturer.

2.08 MAIN LINE CIRCUIT BREAKERS

- A. Type - Main line, 600 volt, 100% rated, molded case circuit breaker mounted upon and sized to the output of the generator shall be installed as a load circuit interrupting and protection device. It shall operate both manually for normal switching functions and automatically during overload and short circuit conditions.
- B. Main Line Circuit Breaker shall have an adjustable trip rating as shown on the

Drawings.

- C. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall meet standards established by Underwriters Laboratories, National Electric Manufacturers Association, and National Electrical Code.
- D. Generator exciter field circuit breakers do not meet the above electrical standards and are unacceptable for line protection.
- E. Circuit breaker shall have battery voltage operated shunt trip wired to safety shutdowns to open the breaker in the event of engine failure. Provide circuit breaker status (Open/Closed) for remote monitoring by SCADA.
- F. The rating of the circuit breakers shall allow the starting of full generator SKVA.
- H. The circuit breaker enclosure, together with all specified circuit breakers, shall be designed for the specific generator set specified and be equipped with rear copper stabs, or load cable lugs and be finish painted to match the generator set.

2.09 GENERATOR CONTROL PANELS

- A. Type - A generator-mounted, NEMA 1 type, vibration isolated, 14-gauge steel control panel shall be provided for the generator set. Control panel shall be Caterpillar model EMCP4.4.
- B. Regulation of NFPA 110 Level 2 shall apply for instrumentation, alarm and shutdown. The instrumentation panel shall include, but not necessarily be limited to:
 - 1. Gages for engine : digital or analog gages with $\pm 2\%$ full scale accuracy :
 - a. Oil Pressure
 - b. Engine Coolant Temperature
 - c. Voltmeter for DC Battery
 - 2. Gages for generator : digital or analog gages with $\pm 2\%$ full scale accuracy:
 - a. AC Ammeter : Dual range
 - b. AC Voltmeter : Dual range
 - c. Frequency Meter : Range of 45-65 Hz.
 - 3. 0-3000 RPM Tachometer - digital or analog gage with $\pm 2\%$ full scale accuracy.
 - 4. A seven position phase selector switch with – OFF position to show meter display of current and voltage of each generator phase. This selector switch may be manual or push-button.
 - 5. A power source with circuit protection – 12 or 24 VDC.

6. An AC interlock to prevent starter re-engagement with engine running.
7. DC circuit protection.
8. Eight (8) individual fault indicator lights for :
 - a. Overcrank Shutdown – Red
 - b. Overspeed shutdown – Red
 - c. High Coolant Temperature – Red
 - d. Low Engine Oil Pressure – Red
 - e. High Engine Coolant Temperature Prealarm – Yellow
 - f. Low Engine Oil Pressure Prealarm – Yellow
 - g. Low Fuel – Yellow
 - h. Run – Green

C. Switches and Controls

1. Rheostat for adjusting output voltage of the generator to $\pm 5\%$ of nominal voltage.
2. Over voltage protection shutdown switch.
3. Emergency stop switch mounted on control panel.
4. Engine start switch – with Run, Off, Reset, Automatic positions.
5. Five minute engine cool down timer.
6. Cyclic cranking switch.

D. Dry contacts for remote generator running indication, remote generator fail indication and cranking battery low voltage wired to terminal strips. At a minimum provide dry contacts for generator running, generator fault, cranking battery low voltage, and main circuit breaker status. Refer to drawings for required conduit/conductors.

E. All electrical penetrations in any enclosure shall be properly sealed from the weather.

F. Digital or solid state meters or metering devices shall be acceptable as a substitute for the electromechanical devices specified.

G. Engraved, screw-on type nameplates will identify each function indicated without abbreviation of function description. So-called international symbols will not be acceptable substitutes for this mandatory requirement.

H. Timing Functions - All control panel timing functions shall be accomplished by metal encased, solid-state, plug-in timing relays with 2PDT output contacts rated for ten (10) amperes. All solid-state time delay relays shall be reverse polarity protected and shall not

function or be damaged by the application of improper polarity. Open printed circuit board type time delay circuits will not be accepted.

- I. Control Relays - All control relays shall be the 3PDT plug-in type with .187QC blade terminals rated for (10) amperes. Each relay shall be equipped with a manual push to operate check button, L.E.D. or neon visual indicator, and see-thru dust cover for contact inspection and protection. Exposed contact and octal base plug-in relays are not acceptable.
- J. Relay Sockets - All relay sockets shall be of the molded thermoplastic type, suitable for snap mounting on standard D.I.N. rail. Relay sockets will have wire clamp type terminals for secure wire connections, and one (1) piece bus bar connectors between the actual relay blade and wire clamp terminal. Relay sockets shall be rated for fifteen (15) amperes at 300V. Printed circuit board type relay sockets and relay sockets with push- on quick connect terminals are not acceptable.

2.10 GENERATOR FUEL SYSTEM

- A. Due to limited physical dimensions available at the site the units must have the exact physical dimensions as shown on the Drawings.
- B. Fuel tank shall be UL 142 rated and maximum 54" in height.
- C. The generator tank shall be sized to provide 72-hours of continuous operation at 100% load and assuming a 90% tank capacity.
 - 1. Interstitial space with FDEP Approved Leak Detection Switch (FPI LS1001 EQ#817).
 - 2. Mechanical Fuel Level Gauge (Visible at Fill Point).
 - 3. Supply and Return Connections.
 - 4. 2" Fill with Lockable Cap with FDEP spill containment.
 - 5. Vent Fittings Installed Per UL 142.
 - 6. Low Level Fuel Alarm Switch (FPI LS1001 EQ#817). Set at 40% remaining capacity wired to Control Panel Terminal Strip.
 - 7. High Level Fuel Alarm Switch (FPI LS1001 EQ#817). Set at 90% tank capacity wired to Control Panel Terminal Strip. Provide local red alarm light and local audible alarm to indicate high level during fueling
 - 8. Cable Stub Up Opening Under Circuit Breaker.
 - 9. Tank coated with Two Part Epoxy Primer and painted Gloss Black.
 - 10. Tank sealed and shipped under vacuum per Florida Administrative Code Chapter 62-762 and NFPA30.

11. Tank shall carry a two (2) hour fire rating.
12. Tank shall be manufactured by Phoenix Products of Jacksonville, Florida.

2.11 AUTOMATIC TRANSFER SWITCH

- A. The Automatic Transfer Switch shall be UL 1008 Listed. Automatic Transfer Switch shall be Eaton, Service Entrance Rated, Molded Case Circuit Breaker Type, 200 amp, 480 volt, 3 pole, ATC-900 controller, with stainless steel enclosure. Catalog No ATV9LDB30400XDU.
- B. Standard Features: 1b, 1c, 1d, 2a, 3b, 3c, 3d, 4b, 5h, 5j, 5k, 5l, 5m, 6b, 7a, 8e, 10b, 10d, 12c, 12d, 12g, 12h, 14c, 14d, 15e, 15f, 23m, 26h, 26j, 26k, 26l, 26m, 32a, 42, 48f, 48u, 49c.
- C. Optional Features: 12l, 12m, 16b, 37a, 38b, 51fl, 54b, 61f, 80d.
- D. Features Description:
 1. 1b. Time Delay Normal to Emergency Adj. 0-9999 sec
 2. 1c. Time Delay Normal Disconnect Adjustable 0-10 Sec
 3. 1d. Time Delay Normal Reconnect Adjustable 0-60 Sec
 4. 2a. Time Delay Engine Start Adj. 0-120 sec
 5. 3b. Time Delay Emergency to Normal Adj. 0-9999 sec
 6. 3c. Time Delay Emergency Disconnect Adjustable 0-10 Sec
 7. 3d. Time Delay Emergency Reconnect Adjustable 0-10 Sec
 8. 4b. Time Delay Engine Cool-off Adj. 0-9999 sec
 9. 5h. Emergency (S2) Sensing Phase Reversal
 10. 5j. Emergency (S2) Sensing Under Voltage/Under Freq
 11. 5k. Emergency (S2) Sensing Over Voltage/Over Freq
 12. 5l. Emergency (S2) Sensing Voltage Unbalance
 13. 5m. Emergency (S2) Sensing Phase Loss
 14. 6b. Test Pushbutton
 15. 7a. Time Delay Engine Fail Adj. 0-6 sec
 16. 8e. Bypass All Timers
 17. 10b. Source Selector - Utility to Utility or Utility to Gen
 18. 10d. Source Selector - Generator to Generator
 19. 12c. LED Indicator Normal Position
 20. 12d. LED Indicator Emergency Position
 21. 12g. LED Indicator Normal Source Available
 22. 12h. LED Indicator Emergency Source Available
 23. 12l. Normal Trip 400 Amps
 24. 12m. Emergency Trip 400 Amps
 25. 14c. Normal (S1) Source Available (4 Form C)
 26. 14d. Emergency (S2) Source Available (4 Form C)
 27. 15e. Normal (S1) Position Indication (1 Form C Micro Switch Outputs)
 28. 15f. Emergency (S2) Position Indication (1 Form C Micro Switch Outputs)
 29. 16b. Power Switch Overcurrent Protection Both Normal & Emergency
 30. 22. Ground Bar

31. 23m. Auto Plant Exerciser Selectable-Disabled/Daily/Calendar Dates, 0-600
32. min, Load/No Load w/Fail Safe
33. 26h. Normal (S1) Sensing Phase Reversal
34. 26j. Normal (S1) Sensing Under-voltage/Under-frequency
35. 26k. Normal (S1) Sensing Over-voltage/Over-frequency
36. 26l. Normal (S1) Sensing Voltage Unbalance
37. 26m. Normal (S1) Sensing Phase Loss
38. 32a. Time Delay Neutral Adjustable 0 - 120 seconds
39. 37a. Rated as Suitable for Service Entrance w/o Ground Fault
40. 38b. Steel Cover for Controller
41. 42. IBC/CBC Seismic Qualified
42. 48f. MODBUS Communication
43. 48u. USB Port for Memory Stick
44. 49c. Multi-Tap Transformer
45. 51f1. 100KA CVX Surge Device on S1
46. 54b. Upgrade 316 Stainless 4X
47. 61f. Power Loss Buffer ATC Comm (includes DCT module)
48. 80d. Fireman's Kill Switch Terminal Blocks

PART 3 - EXECUTION

3.01 GENERATOR SET FIELD QUALITY CONTROL

- A. A factory authorized service representative of the product supplied, shall inspect all field assembled and installed components and make any necessary corrections to insure proper equipment operation. Any cost associated with this procedure shall be born by the generator supplier.

3.02 GENERATOR SET TRAINING AND DEMONSTRATION

- A. A factory representative of the product shall provide the City's maintenance personnel with a thorough period of instruction and hands-on session regarding the operation, trouble shooting and maintenance of all components of the product. Typical training period : one hour.
- B. Training shall be video taped and given to the City for future training.

3.03 GENERATOR TESTING

- A. The engine-generator sets shall be given the MANUFACTURER'S standard factory load test prior to shipment.
- B. Prior to final acceptance of the generator set, all equipment furnished under this Section shall be field tested per NFPA 110 to show it is free of any defects and the generator set can operate satisfactorily under full load test using resistance type load banks (brine tanks not acceptable). Test shall be for four (4) continuous hours. Any defects which become evident at this time shall be corrected before acceptance.
- C. An all-in-place static alignment check of all rotating components shall be made

prior to first start-up, after unit is secured in place and all final connections are made.

D. Site Tests: An installation check, start-up and load test shall be performed by the manufacturer's local representative. The Engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

1. Fuel, lubricating oil, an antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.
2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery charger, generator strip heaters, annunciator, etc.
3. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage, and phase rotation.
4. Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination.
5. External load bank tests shall be performed with the following criteria:
 - i) One (1) hour at 25% load
 - ii) One (1) hour at 50% load
 - iii) One (1) hour at 75% load
 - iv) One (1) hour at 100% load

Engine coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the load bank tests and a written report shall be provided to the Engineer for record purposes. If, for any reason, any of the one hour load bank tests are interrupted, the associated test shall be repeated.

E. A final alignment check and/or adjustment shall be made successful completion of the load bank tests.

3.04 GENERATOR SET SPARE PARTS

A. The spare parts shall include, but not necessarily be limited to the following:

1. Six (6) Fuses of each type and size used.
2. One (1) Oil, air and fuel filter.
3. One (1) set of belts.
4. One (1) of each special tool or device, if any, required to maintain the

generator set and included equipment.

3.05 WARRANTY

- A. Equipment furnished under this Section shall be guaranteed against defective parts and workmanship under terms of the MANUFACTURER'S and dealer's warranty. But, in no event, shall it be for a period of less than five (5) years and 2,500 operating hours from date of acceptance of the system by the city of Tampa and shall include labor, parts and travel time for necessary repairs at the job site. Submittal data received without written warranties as specified will be rejected in their entirety.

END OF SECTION

SECTION 17000 – FIBERGLASS WETWELL

W-17000.01 – General

Fiberglass reinforced polyester wetwells shall be manufactured from commercial grade polyester resin or vinyl ester resin, with fiberglass reinforcements. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems. The wetwell shall be a one-piece unit manufactured by L. F. Manufacturing, Inc., Giddings, Texas, 1-800-237-5791, or approved equal.

W-17000.02 – Materials

Resin: The resins used shall be a commercial grade unsaturated polyester resin.

Reinforcing Materials: The reinforcing materials shall be commercial Grade “E” type glass in the form of mat, continuous roving, chopped roving, roving fabric or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

Surfacing Material: If reinforcing materials are used on the surface exposed to the contained substance, it shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.

Fillers and Additives: Fillers, when used, shall be inert to the environment and wetwell construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification.

W-17000.03 – Fabrication

Exterior Surface: The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 1/2 inch in diameter, delamination and fiber show. For a UV inhibitor the resin on the exterior surface of the manhole shall have gray pigment added for a minimum thickness .125 inches.

Interior Surface: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of grazing, delamination, and blisters larger than 1/2 inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted up to 6 square feet if they are less than 3/4 inch in diameter and less than 1/16 inch deep.

Fiberglass Reinforced Bottom: Wet wells shall be supplied without fiberglass bottoms.

Fiberglass Reinforced Top: The fiberglass wetwell top shall be fabricated using fiberglass material as stated in section A.2. Material and installation to meet all physical requirements as per section A.4. Top to be attached to wetwell pipe with fiberglass layup to comply with A.S.T.M.-D3299

specifications. When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to wetwell bottom per A.S.T.M.-D3299.

Installation Of Stubouts: Factory installed stubouts shall be as shown on the plans. Installation of stubouts to be fiberglass layup to comply with A.S.T.M.-D3299 specifications. Stubouts should be flush.

The outside diameter of the wetwell, including any factory installed stubouts like pipe sleeves, ribs, or flanges, shall not exceed 10'-4".

Defects Not Permitted:

- a. Exposed fibers: glass fibers not wet out with resin.
- b. Resin runs: runs of resin and sand on the surface.
- c. Dry areas: areas with glass not wet out with resin.
- d. Delamination: separation in the laminate.
- e. Blisters: light colored areas larger than 1/2 inch in diameter.
- f. Crazeing: cracks caused by sharp objects.
- g. Pits or Voids: air pockets.
- h. Wrinkles: smooth irregularities in the surface.
- i. Sharp projection: fiber or resin projections necessitating gloves for handling.

W-17000.04 – Physical Requirements

Load Rating: The complete wetwell shall have a minimum dynamic-load rating of 16,000 ft-lbs when tested in accordance with Section A.5. To establish this rating, the complete wetwell shall not leak, crack, or suffer other damage when load tested to 40,000 ft-lbs and shall not deflect vertically downward more than 1/4 inch at the point of load application when loaded to 24,000 lbs.

Stiffness: The wetwell cylinder shall have a minimum pipe-stiffness value shown in Table 1 when tested in accordance with Section A.5.

LENGTH – FT.	F/AY – PSI
10 to 20	2.01
21 to 30	3.02
31 to 40	5.24

Physical Properties:

	Hoop Direction	Axial Direction
a. Tensile Strength(psi)	18,000	5,000
b. Tensile Modules(psi)	0.8 x 10 ⁶	0.7 x 10 ⁶
c. Flexural Strength(psi)	26,000	4,500
d. Flexural Modules(psi)		
(no ribs – 48", 60", 72")(psi)	1.4 x 10 ⁶	0.7 x 10 ⁶
(with ribs – 96", 144")(psi)	0.7 x 10 ⁶	0.7 x 10 ⁶

W-17000.05 – Test Methods

Tests shall be performed as specified in A.S.T.M.-D3753 latest edition, Section 8.

W-17000.06 – Installation

Excavation:

General: Wetwells will be installed in existing concrete structures. Flowable fill will be used to fill voids between structure and wet well.

Handling: Do not drop or impact the wetwell. Wetwells shall be chocked if stored horizontally. If wetwells must be moved by rolling, the ground transversed shall be smooth and free of rocks, debris, etc. FRP wetwells may be lifted by the installation of two lifting lugs as specified by the manufacturer on the outside surface near the top or by a sling or “choker” connection around the center. Use of chains or cables in contact with the wetwell surface is prohibited. Wetwells may be lifted horizontally using one support point.

Open Bottom Wetwell Installation: Wet well will be installed on concrete floor of existing structure. A flange, pointing inward, shall be provided on the bottom of the wet well for anchoring the wet well to the concrete floor.

Cutouts: Cutouts in wetwell wall should be made with proper cutting tools, such as jig saw or hole saw. Do not use axe or other impact-type tools.

Installation Of Sewer Pipe:

Factory installed fiberglass sleeves shall be provided for installing large diameter pressure pipes or gravity sewer pipes at the locations shown in the plans. Sleeves shall be adequately sized to accommodate respective pipe size and the type of pipe adapter (Link Seal, Kor-n-Seal, etc.) shown in the plans. Sleeves should be flush.

Smaller diameter pipe penetrations like electrical conduits, drain pipes, etc. can be installed using cutouts in the wet well walls/top slab as discussed below.

Type 1: Make the cutout in the wetwell wall, the outside diameter of pipe, plus 1/2 inch maximum. Slip pipe into position. Apply industrial grade silicone around the pipe next to the wetwell wall cutout on the inside and on the outside. Cover the outside siliconed area with epoxy grout and backfill.

Type 2: Make the cutout in the wetwell wall, the outside diameter of pipe, plus 1/2 inch maximum. Grind the outside surface of the pipe and both the inside and the outside surfaces of the cutout in the wetwell wall. (Apply a priming agent to any PVC pipe that might be used before fiberglass lay-up.) Insert the pipe through the cutout in the wall of the wetwell. Apply fiberglass putty to the inside and the outside of the wetwell wall cutout, filling openings between pipe and cutout. Make a good radius for the fiberglass lay-up. After putty has set-up, fiberglass the pipe into place. Use one layer of woven roving sandwiched between two layers of fiberglass mat. Allow fiberglass to completely set-up before backfilling. Fiberglass layup method to comply with A.S.T.M.-D3299 specifications.

Fiberglass Wetwell Top: The fiberglass wetwell will be provided with a fiberglass top. Fiberglass top shall have access hatch and pipe openings as shown on the plans. The fiberglass top shall have raised fiberglass collars around the hatch openings. Access hatches shall be as specified in the plans and shall be supplied by the fiberglass wet well manufacturer. Access hatches shall have clear openings as shown in the plans. Raised fiberglass collar dimensions shall be determined by the wet well manufacturer based on the selected hatch size. The fiberglass top shall be H20 rated and shall be designed to withstand the weight of a concrete reinforced slab to be installed over it.

Backfill:

Backfill Material: Flowable fill shall be used for backfill around the wetwell in the existing concrete structure, up to approximately 4 feet below grade. Suitable backfill material chosen shall be used for the remainder of the backfill, from 4 feet below grade to grade. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. Backfill material shall be free of vegetation or other extraneous material. Excavated materials which are to be used for fill or backfill may be stockpiled on the site. Location of stockpiles shall be approved by the City. Top soil should be stockpiled separately and used for finish grading around the structure.

Backfill Lifts: Backfill shall be placed in layers of not more than 12 loose measure inches and mechanically tamped to at least 95% Standard Proctor Density. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

APPENDIX A
109th Avenue Pump Station
Asbestos & Lead Survey

Asbestos & Lead Survey

Performed at:
PS No. 183
801 W 109th Ave
Tampa, FL 33612

Report Prepared For:
AECOM
7650 W Courtney Campbell Causeway
Tampa, FL 33607

Report Prepared By:



OHC Environmental Engineering, Inc.
101 South Hoover Blvd, Suite 101
Tampa, Florida 33609

OHC Project #210088-AL

August 5, 2021

PROJECT INFORMATION

OHC PROJECT #: 210088-AL

CLIENT NAME: AECOM

CLIENT CONTACT: Marvin Sanchez
305-333-6532
Marvin.Sanchez@aecom.com

PROJECT LOCATION: PS No. 183
801 W 109th Ave
Tampa, FL 33612

SERVICES: Asbestos & Lead Survey

DATE OF SURVEY: June 15, 2021
July 28, 2021

OHC SURVEYOR: Justin R. Carman
Thomas Martinelli

REPORT REVIEWED BY:



Cristina Jones, CPH, MPH
OHC Operations Manager

LICENSED CONSULTANT:



James F. Rizk, CIH
FLAC #ZA0000060

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	SCOPE OF WORK.....	1
3.0	EXECUTIVE SUMMARY	1
	3.1 Asbestos Survey Results	1
	3.2 Lead Survey Results	1
4.0	ASBESTOS SURVEY	3
	4.1 Asbestos Survey Results	3
	4.2 Asbestos Sampling Methods.....	5
	4.3 Regulatory Requirements.....	5
	4.4 Statutory Requirements.....	6
5.0	LEAD SURVEY	7
	5.1 Lead Survey Results	7
	5.2 Lead Sampling Methods	9
	5.3 Standards for Lead-Containing Paint.....	9
6.0	OTHER OBSERVATIONS	9
7.0	CONCLUSIONS & RECOMMENDATIONS	9
8.0	LIMITATIONS	9
9.0	DOCUMENT CONTENT	10
	APPENDIX A: Photographs of Materials Sampled for Asbestos	11
	APPENDIX B: Photographs of Materials Sampled for Lead.....	28
	APPENDIX C: Asbestos Laboratory Analytical Results	57
	APPENDIX D: Lead Laboratory Analytical Results	67
	APPENDIX E: Consultant & Laboratory Credentials	73

1.0 INTRODUCTION

OHC Environmental Engineering, Inc., (OHC), was contracted by Marvin Sanchez of AECOM to perform a preliminary asbestos survey in compliance with the National Emission Standard for Hazardous Air Pollutants (NESHAP) regulation for asbestos (40 CFR 61 Subpart M). In addition, a survey for lead-containing paint (LCP) was performed in the areas to be disturbed. The surveys were conducted for the upcoming renovations of Pump Station 183, located at 801 109th Ave in Tampa. A representative from OHC, Mr. Justin R. Carman, visited the site on June 15th of 2021, to conduct the initial survey. Mr. Thomas Martinelli of OHC visited the site on July 28th of 2021 to survey the roof and HVAC system.

2.0 SCOPE OF WORK

The station was built in 1970 and will likely be converted into a submersible station. The station is divided into 2 sides which are the dry well and wet well. Some portions of the building will be demoed include walls, floors, ceilings, mechanical, electrical and piping. The survey also included the Roof and HVAC system.

3.0 EXECUTIVE SUMMARY

3.1 Asbestos Survey Results

Based on the results of the Polarized Light Microscopy (PLM) laboratory analysis, **asbestos was not identified** within the scope of this survey.

3.2 Lead Survey Results

Based on the laboratory analysis of paint chip samples, **lead does exist** within the scope of this survey, as indicated in Table 1 below.

TABLE 1: LEAD CONTAINING MATERIALS					
Sample ID	Material Locations	Material Description	Total Quantities	Result	Category
088-PB 2	Drywell Level 3- Pump 1-8" Pipe	Green w/ Grey Paint on Metal Pipe	20 LF	0.15 % wt	LCP
088-PB 4	Drywell Level 3-Pump 1 Valve	Red Paint on Metal Valve	3 Valves	1.8 % wt	LBP
088-PB 6	Drywell Level 2- Handrail	Yellow w/ Red Paint on Metal Rails	120 LF	2.4 % wt	LBP
088-PB 8	Drywell Level 2-4" Vertical Pipe	Green Paint on Metal Pipe	35 LF	0.028 % wt	LCP
088-PB 9	Drywell Level 2-3" Pipe-In Ceiling	Green Paint on Metal Pipe	45 LF	0.024 % wt	LCP

088-PB 11	Drywell Level 2-1” Pipe-East Wall	Blue w/ Green Paint on Metal Pipe	120 LF	2.2 % wt	LBP
088-PB 12	Drywell Level 2-2” Pipe-West Wall	Grey Paint on Metal Pipe	200 LF	1.5 % wt	LBP
088-PB 13	Drywell Level 1- Electrical Cabinet	Grey Paint on Metal Electrical Cabinet	100 SF	0.21 % wt	LCP
088-PB 15	Drywell Level 1- Concrete Flooring- Southeast Corner	Grey Paint on Concrete Floor	400 SF	0.021 % wt	LCP
088-PB 16	Drywell Level 1- Interior Door Frame	Light Grey Paint on Metal Frame	1 Frame	0.024 % wt	LCP
088-PB 18	Exterior Concrete Wall-North Side	Beige w/ Tan Paint on Concrete Wall	600 SF	0.058 % wt	LBP
088-PB 19	Exterior-Handrails Between Wet Well and Drywell	Yellow Paint on Metal Rails	70 LF	0.59 % wt	LBP
088-PB 20	Exterior-North Side of Building-Roof Drip Edge	Grey Paint on Metal	60 LF	0.014 % wt	LCP
088-PB 21	Drywell Level 1- Exhaust Motor Cover	Teal Paint on Metal Cover	6 SF	0.51 % wt	LBP

4.0 ASBESTOS SURVEY

Based on the observations and the laboratory analysis of the samples collected from the site, asbestos-containing materials (ACM) **does not exist** within the scope of this survey. The Environmental Protection Agency defines asbestos-containing material (ACM) as any material or product that contains more than one percent (1%) asbestos.

4.1 Asbestos Survey Results

Table 2 below summarizes the samples of suspect ACM collected from the site. The table describes the homogenous sampling area (HSA), sample ID, sample location, material description, quantity, condition, friability, and the laboratory analytical result. Please refer to the Appendices at the end of this report for photographs of the materials sampled and official laboratory analytical results.

LEGEND:

- NAD = No Asbestos Detected
- ### = the material contains asbestos and requires compliance with NESHAP and OSHA
- * = Quality Control sample to ensure the reliability of laboratory analytical procedures

TABLE 2: MATERIALS SAMPLED FOR ASBESTOS					
HSA	Sample ID	Sample Location	Material Description	Quantity, Condition, Friability	Results
1	088-1A*	Drywell Level 3-East Wall	Concrete Flooring/Walls	Throughout Good Non-Friable	NAD
	088-1B	Drywell Level 2-South Wall			
	088-1C	Drywell Level 1-West Wall			
2	088-2A	Drywell Level 3-Pump 1 Pedestal	Concrete Pedestals	50 SF Good Non-Friable	NAD
	088-2B	Drywell Level 3-Pump 1 Pipe Pedestal			
	088-2C	Drywell Level 3-Pump 2 Pipe Pedestal			
3	088-3A	Drywell Level 3-Pump 1	Red Gaskets	30 Good Non-Friable	NAD
	088-3B	Drywell Level 3-Pump 1			
	088-3C	Drywell Level 3-Pump 2			
4	088-4A	Drywell Level 1-Southwest Corner-Exhaust	Exhaust Dampener	6 LF Good Non-Friable	NAD
5	088-5A	Exterior-Top of Steps-Between Wet Well and Drywell	Fire Caulking	6 LF Good Non-Friable	NAD
6	088-6A	Wet Well-North Wall	Wall Texturing	1,200 SF Good Non-Friable	NAD
	088-6B	Wet Well-East Wall			
	088-6C	Wet Well-West Wall			
7	183-1A	Roof Front	Built-up Roof	1,200 SF Good Non-Friable	NAD
	183-2A	Roof Center			
	183-3A	Roof Rear			
8	183-2A	HVAC Unit	Mastic/Caulk	150 LF Good Non-Friable	NAD
9	183-3A	Roof Center	Roof Tar	1,200 SF Good Non-Friable	NAD
10	183-4A	HVAC Unit	Vibration Damper	2 Dampers Good Non-Friable	NAD

4.2 Asbestos Sampling Methods

Asbestos sampling was conducted in accordance with NESHAP (40 CFR 61, Subpart M) protocol for the commencement of demolition/renovation activities. The surveyor conducted a visual inspection of every safe and reasonably accessible room and space of the building. Materials sampled were grouped into Homogenous Sampling Areas (HSA) based on the texture, color, use, age, condition, and every other visual appearance to identify suspect ACM. Materials containing asbestos are grouped into the following categories:

- **Regulated ACM (RACM):** Refers to friable manufactured ACM or a Category I non-friable ACM that has become friable; or a Category I Non-Friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading; or a Category II Non-Friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.
- **Category I Non-Friable ACM:** Refers to asbestos containing packing, gaskets, resilient floor coverings (including mastics), and asphalt roofing products containing more than 1% asbestos.
- **Category II Non-Friable ACM:** Refers to any material that is not a Category I Non-Friable ACM that contains greater than 1% asbestos.

Bulk samples of all friable and non-friable suspect ACM were collected, as well as a representative number of samples from each homogeneous area following the EPA's simplified random sampling method (EPA560/585-030a). Good Industrial Hygiene practices were followed when collecting bulk samples in order to minimize fiber release. Every precaution was taken to prevent asbestos exposure to the surveyor, the building occupants, and the public. All sample locations were logged with an appropriate description and the locations were marked on any available drawings. A unique sequential numbering system was used to identify each area. Each bulk sample was placed in a labeled bag, which was immediately marked with its sample number. Strict Chain-of-Custody protocols were followed and signed by the receiving laboratory personnel who handled the samples. The samples were analyzed via PLM EPA-600 by an AIHA and NVLAP Accredited laboratory. Quality control samples were analyzed by EMSL Analytical in Ft. Lauderdale, Florida for Quality Control procedures during the analysis of asbestos content. The purpose is to monitor the performance of the laboratories where samples are being analyzed in order to provide competence and reliability assurance.

4.3 Regulatory Requirements

Demolition: According to NESHAP, 40CFR61 Subpart M, demolition is defined as the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

The final NESHAP Rule provides classification for regulated asbestos containing material as follows:

- Friable asbestos material;
- Category I non-friable ACM that has become friable;
- Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or
- Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by forces expected to act upon the material in the course of demolition or renovation operations.

If the total asbestos content is determined to be trace to 10%, the owner must either assume that the material contains greater than 1% asbestos and treat the material as regulated asbestos-containing material (RACM) or have the material verified/quantified by point counting. If after point counting, the material is quantified as 1% or less, it is not regulated by the NESHAP. The Occupational Safety and Health Administration (OSHA) considers material that contains any amount of asbestos as asbestos-containing and requires compliance with OSHA regulations. The demolition of a structure with materials present that contain any amount of asbestos is considered by OSHA as an asbestos abatement, and all applicable OSHA rules must be complied with during the demolition.

Notification: Notification is required to the local regulatory agency:

1. Ten (10) working days prior to a demolition.
2. Ten (10) working days prior to a renovation operation, if the amount of asbestos material removed or impacted is greater than 160 SF on all building components (i.e. floor tile, mastic, GWBS, etc.) or 260 LF on pipes.
3. One (1) day prior to demolition, if the building has been condemned and is structurally unsound as determined by the appropriate agency.

Notification must be sent by certified mail with return receipt or hand delivered to the Florida Department of Environmental Protection. The demolition contractor must wait ten (10) working days (Monday – Friday) from the postmarked date of mailing or the date of hand delivery to commencement of demolition. Any change to the start date of the demolition requires notification to the agency by phone, followed by a written revision to the Notification Form.

4.4 Statutory Requirements

The regulatory agency responsible for the oversight of the rules pertaining to asbestos-containing building materials (ACBM) is the Environmental Protection Agency (EPA). The regulations state that prior to demolition or renovation a facility survey must be conducted in accordance to section 40 CFR 61-M National Emission Standards for Hazardous Air Pollutants; Asbestos NESHAP Revisions, Final Rule.

Enforcement of these rules was passed on to the states. In the State of Florida they are enforced by the Department of Environmental Protection (DEP). Some counties have developed an enforcement division to carry out the responsibilities of the DEP and have developed environmental and asbestos ordinances with which compliance is required.

5.0 LEAD SURVEY

Based on the laboratory analysis of paint chip samples, **lead does exist** in the areas to be disturbed.

5.1 Lead Survey Results

Table 3 below summarizes the materials tested for lead and includes their color, substrate, description and location, and lead content. Please refer to the Appendices at the end of this report for photographs of the materials sampled and official laboratory analytical results.

LEGEND:

- ### = the sample that contains Lead at levels that will require compliance with EPA and OSHA.
- < = the analyte could not be detected at the reporting limit
- BLC = Below Levels of Concern
- LBP = Lead-Based Paint (0.50% wt and above)
- LCP = Lead-Containing Paint (0.49% wt and below)
- NLD = No Lead Detected

TABLE 3: MATERIALS SAMPLED FOR LEAD					
Sample ID	Sample Location	Material Description	Quantity	Lab Result	Category
088-PB 1	Drywell Level 3- West Wall	Beige w/ Green Paint on Concrete Wall	Throughout	<0.0080 % wt	NLD
088-PB 2	Drywell Level 3- Pump 1-8" Pipe	Green w/ Grey Paint on Metal Pipe	20 LF	0.15 % wt	LCP
088-PB 3	Drywell Level 3- Pump 2 Valve	Blue Paint on Metal Valve	8 LF	<0.013 % wt	NLD
088-PB 4	Drywell Level 3- Pump 1 Valve	Red Paint on Metal Valve	3 Valves	1.8 % wt	LBP
088-PB 5	Drywell Level 3- Pump 1	Black Paint on Metal Pump	50 SF	<0.023 % wt	NLD
088-PB 6	Drywell Level 2- Handrail	Yellow w/ Red Paint on Metal Rails	120 LF	2.4 % wt	LBP

088-PB 7	Drywell Level 2-14" Pipe-Southeast Corner	Green w/ Beige Paint on Metal Pipe	25 LF	<0.064 % wt	NLD
088-PB 8	Drywell Level 2-4" Vertical Pipe	Green Paint on Metal Pipe	35 LF	0.028 % wt	LCP
088-PB 9	Drywell Level 2-3" Pipe-In Ceiling	Green Paint on Metal Pipe	45 LF	0.024 % wt	LCP
088-PB 10	Drywell Level 2-Center of Ceiling	Beige Paint on Concrete	1,200 SF	<0.024 % wt	NLD
088-PB 11	Drywell Level 2-1" Pipe-East Wall	Blue w/ Green Paint on Metal Pipe	120 LF	2.2 % wt	LBP
088-PB 12	Drywell Level 2-2" Pipe-West Wall	Grey Paint on Metal Pipe	200 LF	1.5 % wt	LBP
088-PB 13	Drywell Level 1-Electrical Cabinet	Grey Paint on Metal Electrical Cabinet	100 SF	0.21 % wt	LCP
088-PB 14	Drywell Level 1-Breaker Box-Southwest Corner	Grey Paint on Metal Breaker Box	12 SF	<0.011 % wt	NLD
088-PB 15	Drywell Level 1-Concrete Flooring-Southeast Corner	Grey Paint on Concrete Floor	400 SF	0.021 % wt	LCP
088-PB 16	Drywell Level 1-Interior Door Frame	Light Grey Paint on Metal Frame	1 Frame	0.024 % wt	LCP
088-PB 17	Exterior-Door and Frame	Dark Grey Paint on Metal Doors/Frames	2 Doors/Frames	<0.018 % wt	NLD
088-PB 18	Exterior Concrete Wall-North Side	Beige w/ Tan Paint on Concrete Wall	600 SF	0.058 % wt	LBP
088-PB 19	Exterior-Handrails Between Wet Well and Drywell	Yellow Paint on Metal Rails	70 LF	0.59 % wt	LBP
088-PB 20	Exterior-North Side of Building-Roof Drip Edge	Grey Paint on Metal	60 LF	0.014 % wt	LCP
088-PB 21	Drywell Level 1-Exhaust Motor Cover	Teal Paint on Metal Cover	6 SF	0.51 % wt	LBP
088-PB 22	Exterior-Southwest Corner of the Building-Electrical Meter	Grey Paint on Electrical Box	5 LF	<0.012 % wt	NLD
088-PB 23	Exterior-Southeast Corner of Property-Valve	Green w/ Teal Paint on Metal Pipe	6 LF	<0.0080 % wt	NLD
088-PB 24	Wet Well-East Wall	Beige Paint on Concrete Wall	1,200 SF	<0.0080 % wt	NLD

5.2 Lead Sampling Methods

All samples were collected by a trained Lead-Containing Paint inspector, placed in a sterile bag, and appropriately labeled. Strict Chain-of-Custody protocols were followed and signed by the receiving laboratory personnel who handled the samples. All samples were analyzed via Flame Atomic Absorption Spectroscopy (FAAS) by EMSL Analytical in Orlando, Florida.

5.3 Standards for Lead-Containing Paint

There is presently no standard on the level of lead in paint other than the HUD guidelines of 0.5% by weight or 1.0 mg/cm², which is used as a threshold for remedial action. OSHA, on the other hand, does not recognize these criteria. The consumer product safety commission has established a level of 0.06% as a threshold for lead-free paint. Any levels of lead in paint are considered lead-containing paint (LCP). OSHA's standards for lead are based on the potential for human exposure by means of inhalation and ingestion. Therefore, any substrate with any level of LCP could cause health concerns when the paint is disturbed. Performing activities could create airborne exposures of lead above the PEL. Any persons performing any lead activities such as LCP renovation, repair, painting, or maintenance that may disturb the paint must be certified by EPA to perform these activities in accordance with the Renovation, Repair, and Painting (RRP) rule 40 CFR 745 Subpart E.

6.0 OBSERVATIONS

- The structure contained concrete wall, floors, and ceilings throughout the interior and exterior
- Painted surface throughout most of the Pump Station appeared to be in either fair or poor condition
- No suspect insulation was observed on or in the HVAC unit duct work.

7.0 CONCLUSIONS & RECOMMENDATIONS

Based on the results of the survey, asbestos is not present. However, lead-based paint and lead-containing paint are present. The contractor must use caution when disturbing these materials and ensure compliance with EPA, OSHA and all other regulatory agencies.

8.0 LIMITATIONS

The materials sampled in this survey were subject to accessibility. This survey is limited to PS No. 183. OHC warrants that the investigations and methodology reflect the prevailing standard of work practices in the environmental consulting field. If it is expected that materials outside the scope of this survey are to be disturbed, they must be presumed hazardous until the materials can be analyzed by an accredited building inspector.

9.0 DOCUMENT CONTENT

This document has been prepared for exclusive use by AECOM. The knowledge of the consultant is based upon current information and research. If local knowledge indicates error, omissions, or inaccuracy, please notify the consultant.

APPENDIX A

**PHOTOGRAPHS OF MATERIALS
SAMPLED FOR ASBESTOS**



Pump Stat 183: Exterior



Pump Stat 183: Level 1



Pump Stat 183: Level 2



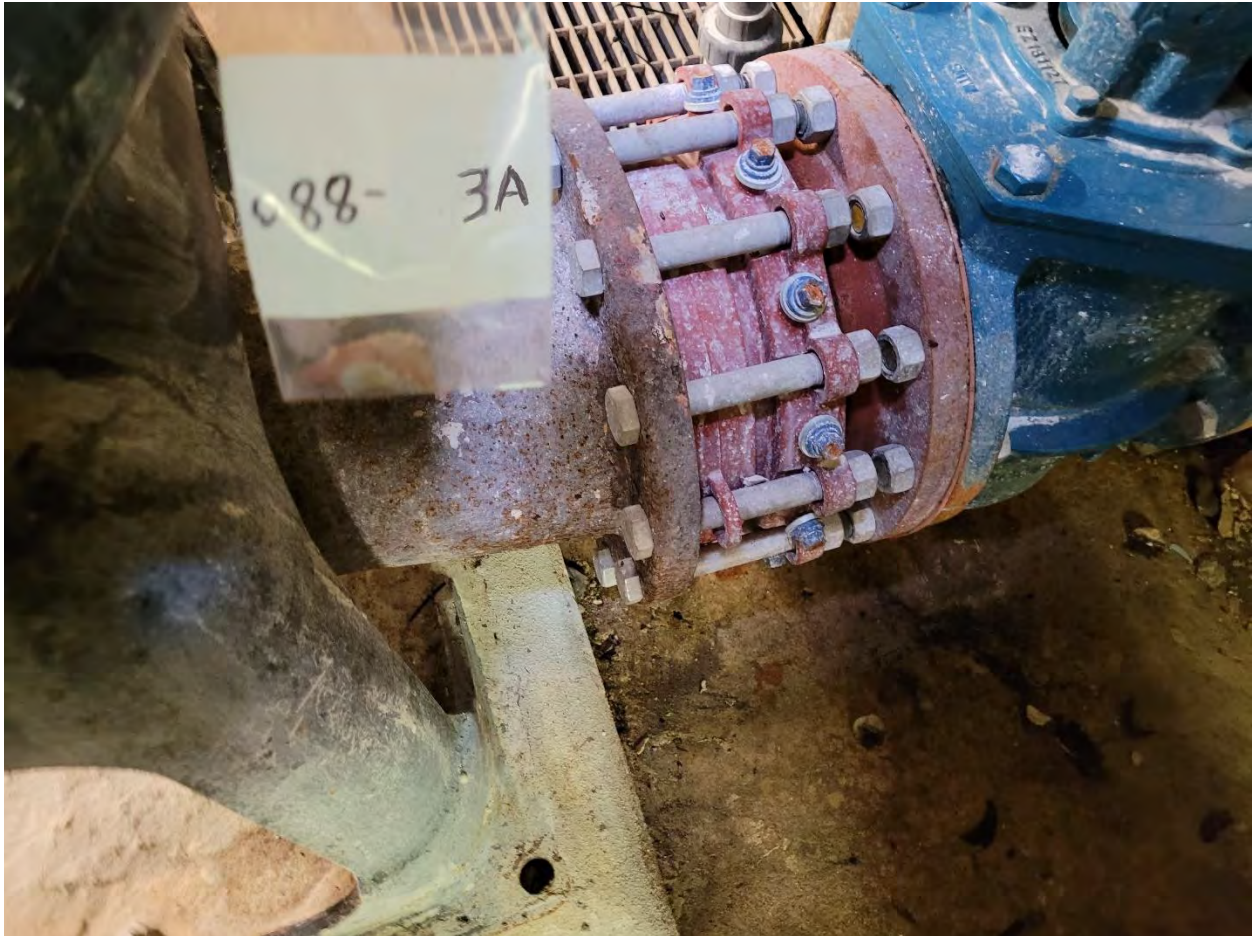
Pump Stat 183: Level 3



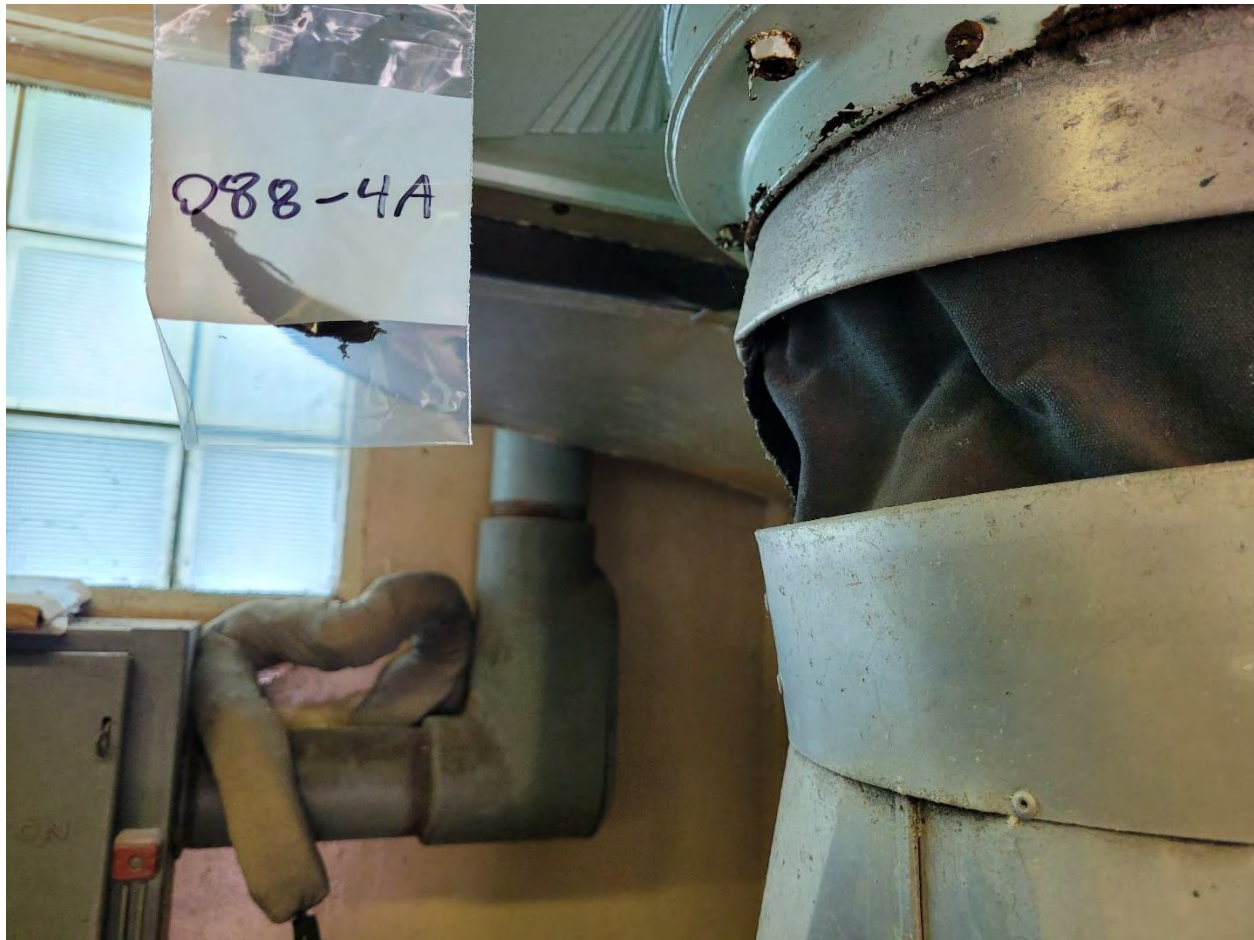
088-1A: Concrete Flooring/Walls [NAD]



088-2A: Concrete Pedestals [NAD]



088-3A: Red Gaskets [NAD]



088-4A: Exhaust Dampener [NAD]



088-5A: Fire Caulking [NAD]



088-6A: Wall Texturing [NAD]



Roofing materials should be sampled after the site is inactive



Electrical Panels and Ductwork should be sampled after the site is inactive



Ductwork should be sampled after the site is inactive



183-1A: Built-up Roof Material [NAD]



183-2A: HVAC Duct Mastic/Caulk [NAD]



183-3A: Roof Tar [NAD]

APPENDIX B

**PHOTOGRAPHS OF MATERIALS
SAMPLED FOR LEAD**



Pump Stat 183: Exterior



Pump Stat 183: Level 1



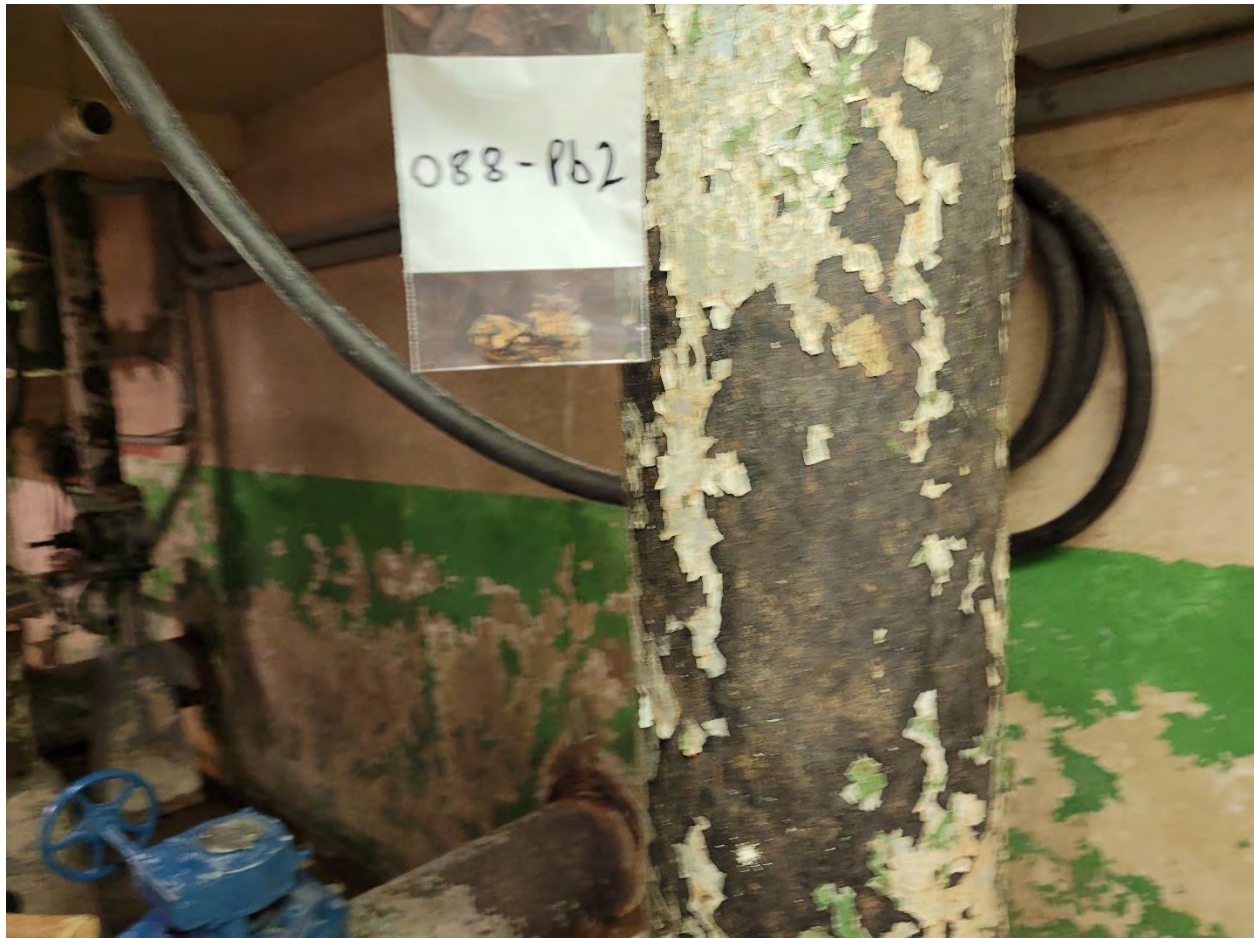
Pump Stat 183: Level 2



Pump Stat 183: Level 3



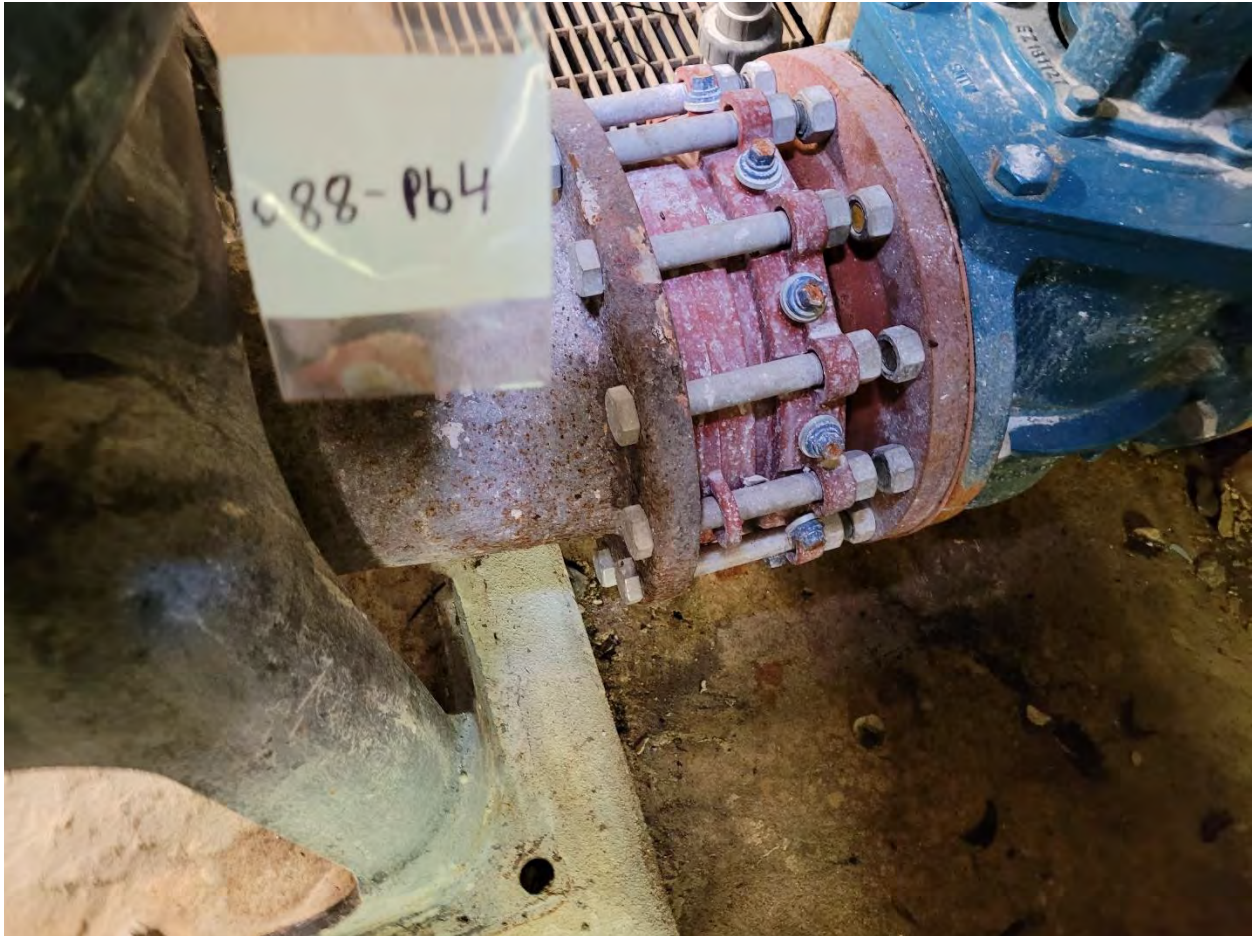
088-PB 1: Beige w/ Green Paint on Concrete Wall [NLD]



088-PB 2: Green w/ Grey Paint on Metal Pipe [<0.15 % wt]



088-PB 3: Blue Paint on Metal Valve [NLD]



088-PB 4: Red Paint on Metal Valve [1.8 % wt]



088-PB 5: Black Paint on Metal Pump [NLD]



088-PB 6: Yellow w/ Red Paint on Metal Rails [2.4 % wt]



088-PB 7: Green w/ Beige Paint on Metal Pipe [0.064 % wt]



088-PB 8: Green Paint on Metal Pipe [0.028 % wt]



088-PB 9: Green Paint on Metal Pipe [0.024 % wt]



088-PB 10: Beige Paint on Concrete [NLD]



088-PB 11: Blue w/ Green Paint on Metal Pipe [2.2 % wt]



088-PB 12: Grey Paint on Metal Pipe [1.5 % wt]



088-PB 13: Grey Paint on Metal Electrical Cabinet [0.21 % wt]



088-PB 14: Grey Paint on Metal Breaker Box [NLD]



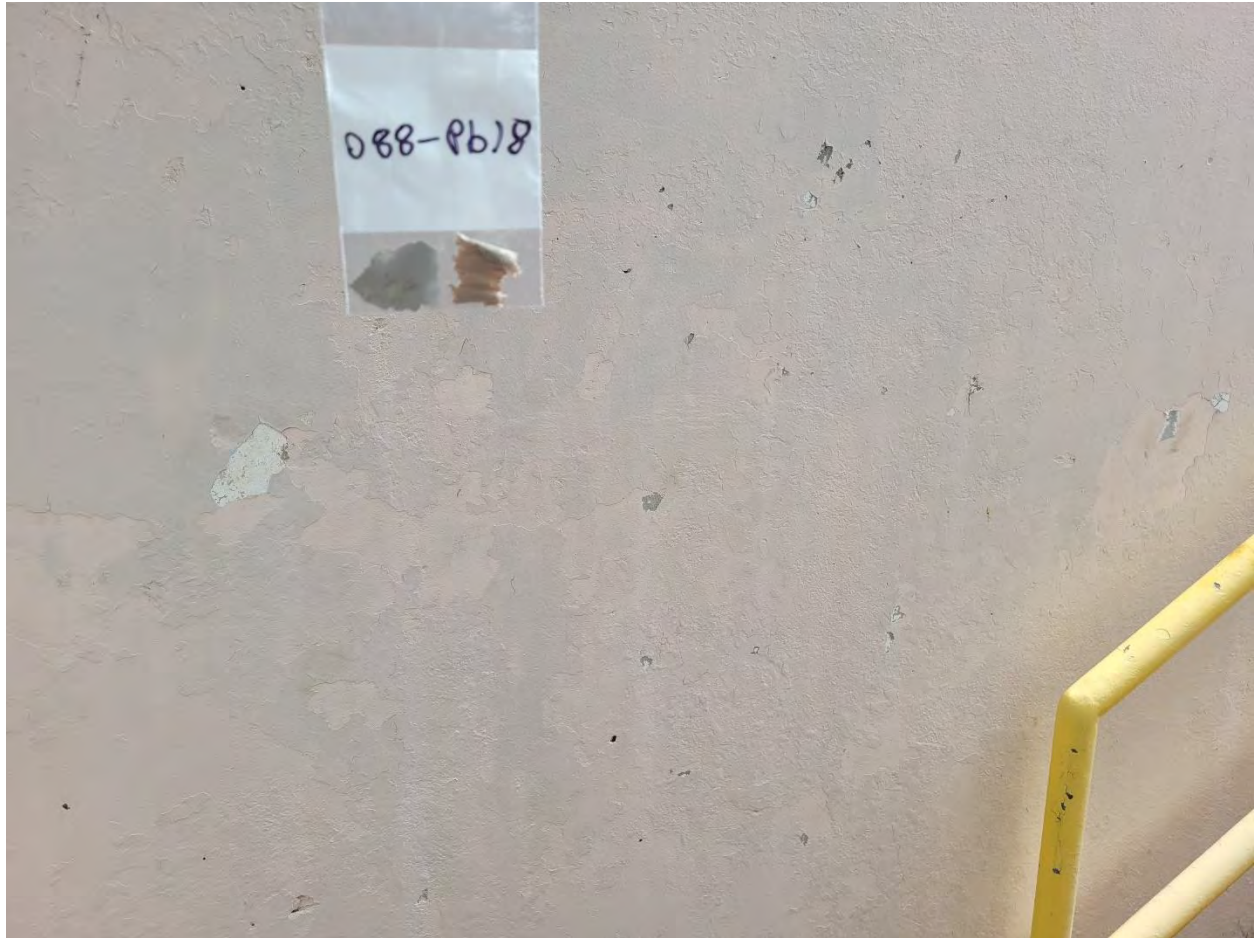
088-PB 15: Grey Paint on Concrete Floor [0.021 % wt]



088-PB 16: Light Grey Paint on Metal Frame [0.024 % wt]



088-PB 17: Dark Grey Paint on Metal Doors/Frames [NLD]



088-PB 18: Beige w/ Tan Paint on Concrete Wall [0.058 % wt]



088-PB 19: Yellow Paint on Metal Rails [0.59 % wt]



088-PB 20: Grey Paint on Metal [0.014 % wt]



088-PB 21: Teal Paint on Metal Cover [0.51 % wt]



088-PB 22: Grey Paint on Electrical Box [NLD]



088-PB 23: Green w/ Teal Paint on Metal Pipe [NLD]



088-PB 25: Beige Paint on Concrete Wall [NLD]

APPENDIX C

**ASBESTOS LABORATORY
ANALYTICAL RESULTS**



EMSL Analytical, Inc.
 5700 Memorial Highway, Suite 122 Tampa, FL 33615
 Tel/Fax: (813) 280-8752 / (813) 280-8753
 http://www.EMSL.com / tampalab@emsl.com

EMSL Order: 932101608
Customer ID: OCCU56
Customer PO:
Project ID:

Attention: Justin Carman
 OHC Environmental Engineering, Inc.
 101 South Hoover Blvd
 Suite 101
 Tampa, FL 33609
Project: 210088 801 West 109th Avenue, Tampa, FL 33612

Phone: (813) 376-1202
Fax: (813) 623-6702
Received Date: 06/16/2021 12:10 PM
Analysis Date: 06/17/2021
Collected Date: 06/15/2021

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
088-1A* 932101608-0001	Drywell Level 3- East Wall - Concrete Flooring/ Walls	Gray Non-Fibrous Homogeneous	HA: 1	30% Quartz 10% Ca Carbonate 60% Non-fibrous (Other)	None Detected
088-1B 932101608-0002	Drywell Level 2- South Wall - Concrete Flooring/ Walls	Gray Non-Fibrous Homogeneous	HA: 1	30% Quartz 10% Ca Carbonate 60% Non-fibrous (Other)	None Detected
088-1C 932101608-0003	Drywell Level 1- West Wall - Concrete Flooring/ Walls	Tan/White Non-Fibrous Homogeneous	HA: 1	30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	None Detected
088-2A 932101608-0004	Drywell Level 3- Pump 1 Pedestal - Concrete Pedestals	Gray Non-Fibrous Homogeneous	HA: 2	10% Quartz 5% Ca Carbonate 85% Non-fibrous (Other)	None Detected
088-2B 932101608-0005	Drywell Level 3- Pump 1 Pipe Pedestal - Concrete Pedestals	Gray/White Non-Fibrous Homogeneous	HA: 2	10% Quartz 5% Ca Carbonate 85% Non-fibrous (Other)	None Detected
088-2C 932101608-0006	Drywell Level 3- Pump 2 Pipe Pedestal - Concrete Pedestals	Tan/White Non-Fibrous Homogeneous	HA: 2	10% Quartz 15% Ca Carbonate 75% Non-fibrous (Other)	None Detected
088-3A 932101608-0007	Drywell Level 3- Pump 1 - Red Gaskets	Red Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected
088-3B 932101608-0008	Drywell Level 3- Pump 1 - Red Gaskets	Red Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected
088-3C 932101608-0009	Drywell Level 3- Pump 2 - Red Gaskets	Red Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected
088-4A 932101608-0010	Drywell Level 1- Southwest Corner- Exhaust - Exhaust Dampener	Black Fibrous Homogeneous	HA: 4	70% Cellulose 30% Non-fibrous (Other)	None Detected
088-5A 932101608-0011	Exterior- Top of Steps- Between Wet Well and Drywell - Fire Caulking	Red Non-Fibrous Homogeneous	HA: 5	100% Non-fibrous (Other)	None Detected

Initial report from: 06/18/2021 09:39:26





EMSL Analytical, Inc.

5700 Memorial Highway, Suite 122 Tampa, FL 33615
 Tel/Fax: (813) 280-8752 / (813) 280-8753
 http://www.EMSL.com / tampalab@emsl.com

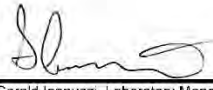
EMSL Order: 932101608
 Customer ID: OCCU56
 Customer PO:
 Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
088-6A 932101608-0012	Wet Well- North Wall - Wall Texturing	Gray/Tan Non-Fibrous Homogeneous	HA: 6	10% Quartz 15% Ca Carbonate 75% Non-fibrous (Other)	None Detected
088-6B 932101608-0013	Wet Well- East Wall - Wall Texturing	Tan Non-Fibrous Homogeneous	HA: 6	10% Quartz 15% Ca Carbonate 75% Non-fibrous (Other)	None Detected
088-6C 932101608-0014	Wet Well- West Wall - Wall Texturing	Gray/Tan Non-Fibrous Homogeneous	HA: 6	10% Quartz 15% Ca Carbonate 75% Non-fibrous (Other)	None Detected

Analyst(s)

Benjamin Brittain (4)
 Christopher Richardson (10)



 Gerald Iannuzzi, Laboratory Manager
 or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Tampa, FL NVLAP Lab Code 600215-0

Initial report from: 06/18/2021 09:39:26





EMSL Analytical, Inc.
 3303 PARKWAY CENTER COURT Orlando, FL 32808
 Tel/Fax: (407) 599-5887 / (407) 599-9063
 http://www.EMSL.com / orlandolab@emsl.com

EMSL Order: 342109570
Customer ID: OCCU56
Customer PO:
Project ID:

Attention: Justin Carman
 OHC Environmental Engineering, Inc.
 101 South Hoover Blvd
 Suite 101
 Tampa, FL 33609
Project: 210088 801 West 109th Avenue, Tampa, FL 33612

Phone: (813) 376-1202
Fax: (813) 623-6702
Received Date: 06/17/2021 10:10 AM
Analysis Date: 06/21/2021
Collected Date: 06/08/2021

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
D88-1A	Drywell Level 3 - East	Gray		30% Quartz	None Detected
	Wall - Concrete	Non-Fibrous		15% Ca Carbonate	
342109570-0001	Flooring/Walls	Homogeneous		55% Non-fibrous (Other)	

Analyst(s)
 Bryan Lopez-Duenas (1)

Carlos Rivadeneyra, Laboratory Director
 or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

Initial report from: 06/21/2021 14:20:56



OrderID: 932101608



OHC Environmental Engineering, Inc.
 101 South Hoover Blvd, Suite 101
 Tampa, FL 33609
 Office: (813) 626-8156

932101608

**ASBESTOS AHERA SURVEY
 CHAIN OF CUSTODY FORM**

Send Report to: Justin R. Carrman
 Email Address: jcarrman@ohcnet.com
 Phone #: 813-376-1202
 OHC Project #: 210088
 Project Location: 301 West 109th Avenue, Tampa, FL 33612
 Sampling Date: 06/15/2021
 Sampled by: Justin R. Carrman
 Relinquished Date: 06/16/2021
 Relinquished by (print): Justin R. Carrman
 Relinquished by (sign): [Signature]

Laboratory Name: EMSL-Tampa
 Type of Analysis: PLM 09/11/21
 Positive Stop: YES
 Turnaround Time: 72 hr
 Total # of Samples: 14

FOR LABORATORY USE
 Date/Time Received: 6/16/21
 Received by (print): Deann Desiano
 Received by (sign): [Signature] 12:10pm

HSA	Sample ID	Sample Location	Material Description	Quantity	Cond	PTD	Friable		
1	088-1A*	Drywell Level 3-East Wall	Concrete Flooring/Walls	Throughout	Good	High	No		
	088-1B	Drywell Level 2-South Wall							
	088-1C	Drywell Level 1-West Wall							
2	088-2A	Drywell Level 3-Pump 1 Pedestal	Concrete Pedestals	50 SF	Good	High	No		
	088-2B	Drywell Level 3-Pump 1 Pipe Pedestal							
	088-2C	Drywell Level 3-Pump 2 Pipe Pedestal							
3	088-3A	Drywell Level 3-Pump 1	Red Gaskets	30	Good	High	No		
	088-3B	Drywell Level 3-Pump 1							
	088-3C	Drywell Level 3-Pump 2							
4	088-4A	Drywell Level 1-Southwest Corner-Exhaust	Exhaust Damper	6 LF	Good	High	No		
5	088-5A	Exterior-Top of Steps-Between Wet Well and Drywell-	Fire Caulking	6 LF	Good	High	No		
								088-6A	Wet Well-North Wall
								088-6B	Wet Well-East Wall
6	088-6C	Wet Well-West Wall	Wall Texturing	1,200 SF	Good	High	No		





EMSL Analytical, Inc.
 5700 Memorial Highway, Suite 122 Tampa, FL 33615
 Tel/Fax: (813) 280-8752 / (813) 280-8753
 http://www.EMSL.com / tampalab@emsl.com

EMSL Order: 932102033
Customer ID: OCCU56
Customer PO:
Project ID:

Attention: Tom Martinelli
 OHC Environmental Engineering, Inc.
 101 South Hoover Blvd
 Suite 101
 Tampa, FL 33609
Project: 210088-AL City of Tampa Pump Stations

Phone: (813) 401-0724
Fax: (813) 623-6702
Received Date: 07/29/2021 9:01 AM
Analysis Date: 07/29/2021
Collected Date: 07/28/2021

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
183-1A-Insulation 932102033-0001	Roof Front - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 1		
183-1A-Felt 932102033-0001A	Roof Front - Roof Tar, Felts and Insulation	Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
			HA: 1		
183-1A-Tar 932102033-0001B	Roof Front - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 1		
183-1B-Insulation 932102033-0002	Roof Center - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 1		
183-1B-Felt 932102033-0002A	Roof Center - Roof Tar, Felts and Insulation	Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
			HA: 1		
183-1B-Tar 932102033-0002B	Roof Center - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
			HA: 1		
183-1C-Insulation 932102033-0003	Roof Rear - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 1		
183-1C-Felt 932102033-0003A	Roof Rear - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
			HA: 1		
183-1C-Tar 932102033-0003B	Roof Rear - Roof Tar, Felts and Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 1		
183-2A 932102033-0004	Roof HVAC Unit - Mastic/ Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 2		
183-3A 932102033-0005	Roof Center - Roof Tar	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 3		
183-4A 932102033-0006	HVAC Unit - Vibration Damper	White Fibrous Homogeneous	15% Synthetic	85% Non-fibrous (Other)	None Detected
			HA: 4		

Initial report from: 07/30/2021 10:05:57





EMSL Analytical, Inc.
 5700 Memorial Highway, Suite 122 Tampa, FL 33615
 Tel/Fax: (813) 280-8752 / (813) 280-8753
 http://www.EMSL.com / tampalab@emsi.com

EMSL Order: 932102033
Customer ID: OCCU56
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
192-1A-Insulation 932102033-0007	Roof Front - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 5		
192-1A-Felt 932102033-0007A	Roof Front - Roof Tar, Felts & Insulation	Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (Other)	None Detected
			HA: 5		
192-1A-Tar 932102033-0007B	Roof Front - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 5		
192-1B-Insulation 932102033-0008	Roof Center - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 5		
192-1B-Felt 932102033-0008A	Roof Center - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
			HA: 5		
192-1B-Tar 932102033-0008B	Roof Center - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 5		
192-1C-Insulation 932102033-0009	Roof Rear - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 5		
192-1C-Felt 932102033-0009A	Roof Rear - Roof Tar, Felts & Insulation	Black Fibrous Homogeneous	3% Cellulose	97% Non-fibrous (Other)	None Detected
			HA: 5		
192-1C-Tar 932102033-0009B	Roof Rear - Roof Tar, Felts & Insulation	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 5		
192-2A 932102033-0010	HVAC Unit - Vibration Damper	White Fibrous Homogeneous	15% Synthetic	85% Non-fibrous (Other)	None Detected
			HA: 6		
192-3A 932102033-0011	Roof Center - Roof Tar	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 7		

Initial report from: 07/30/2021 10:05:57





EMSL Analytical, Inc.

5700 Memorial Highway, Suite 122 Tampa, FL 33615
Tel/Fax: (813) 280-8752 / (813) 280-8753
<http://www.EMSL.com> / tampalab@emsl.com

EMSL Order: 932102033
Customer ID: OCCU56
Customer PO:
Project ID:

Analyst(s)

Khandaker Anam (9)
Wyatt Brown (14)

Gerald Iannuzzi, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Tampa, FL NVLAP Lab Code 600215-0

Initial report from: 07/30/2021 10:05:57

OrderID: 932102033

932102033

ASBESTOS NESHAP CHAIN OF CUSTODY FORM



OHC Environmental Engineering, Inc.
 101 South Hoover Blvd., Suite 101
 Tampa, FL 33609
 Office: (813) 626-8156

Laboratory Name:	EMSL
Type of Analysis:	PLM
Positive Stop:	YES
Turnaround Time:	72 HR
Total # of Samples:	
Date/Time Received:	7/28/21 9:01 AM
Received by (print):	Dawn Desisto
Received by (sign):	Da De

Send Report to:	Tom Martinelli	Sampled by:	T Martinelli
Email Address:	tmartinelli@ohcnet.com	Sampling Date/Time:	7-28-21
Phone #:	813-401-0724	Relinquished by (print):	T Martinelli
OHC Project #:	210088-AL	Relinquished by (sign):	[Signature]
Project Location:	City of Tampa Pump Stations	Relinquished Date/Time:	7-28-21

HSA #	HSA Location	# of HSA Samples	Sample #	Sample Location	Material Description	Quantity	Friable Y/N
1	Pump Station 183	3	183-1A	Roof Front	Roof Tar, Felts and Insulation	400 SF	N
			183-1B	Roof Center			
			183-1C	Roof Rear			
2	Pump Station 183	1	183-2A	Roof HVAC Unit	Mastic/Caulk	150 LF	N
3	Pump Station 183	1	183-3A	Roof Center	Roof Tar	400 SF	N
4	Pump Station 183	1	183-4A	HVAC Unit	Vibration Damper	2 Dampers	N
5	Pump Station 192	3	192-1A	Roof Front	Roof Tar Felts + Insulation	400 SF	N
			192-1B	Roof Center			
			192-1C	Roof Rear			
6	Pump Station 192	1	192-2A	HVAC Unit	Vibration Damper	2 Dampers	N
7	Pump Station 192	1	192-3A	Roof Center	Roof Tar	400 SF	N



APPENDIX D

**LEAD LABORATORY
ANALYTICAL RESULTS**



EMSL Analytical, Inc.
 3303 PARKWAY CENTER COURT, Orlando, FL 32808
 Phone/Fax (407) 599-5887 / (407) 599-9063
<http://www.EMSL.com> orlandolab@emsl.com

EMSL Order: 342109531
 CustomerID: OCCU56
 CustomerPO:
 ProjectID:

Attn: **Justin Carman** Phone: (813) 626-8156
OHC Environmental Engineering, Inc. Fax: (813) 623-6702
101 South Hoover Blvd Received: 6/17/2021 10:10 AM
Suite 101 Collected: 6/8/2021
Tampa, FL 33609
 Project: 210088 801 West 109th Avenue, Tampa, FL 33612

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	Collected	Analyzed	Weight	RDL	Lead Concentration
088-PB 1 342109531-0001	6/8/2021	6/18/2021	0.2739 g	0.0080 % wt	<0.0080 % wt
Site: Drywell Level 3 - West Wall, Beige W/Green Paint On Concrete Wall					
088-PB 2 342109531-0002	6/8/2021	6/18/2021	0.2513 g	0.0080 % wt	0.15 % wt
Site: Drywell Level 3 - Pump 1 - 8" Pipe, Green W/Grey Paint On Metal Pipe					
088-PB 3 342109531-0003	6/8/2021	6/18/2021	0.1506 g	0.013 % wt	<0.013 % wt
Site: Drywell Level 3 - Pump 2 Valve, Blue Paint On Metal Valve					
088-PB 4 342109531-0004	6/8/2021	6/18/2021	0.2862 g	0.080 % wt	1.8 % wt
Site: Drywell Level 3 - Pump 1 Valve, Red Paint On Metal Valve					
088-PB 5 342109531-0005	6/8/2021	6/18/2021	0.0888 g	0.023 % wt	<0.023 % wt
Site: Drywell Level 3 - Pump 1, Black Paint On Metal Pump					
088-PB 6 342109531-0006	6/8/2021	6/18/2021	0.2774 g	0.080 % wt	2.4 % wt
Site: Drywell Level 2 - Handrail, Yellow W/Red Paint On Metal Rails					
088-PB 7 342109531-0007	6/8/2021	6/18/2021	0.2861 g	0.0080 % wt	0.064 % wt
Site: Drywell Level 2 - 14" Pipe Southeast Corner, Green W/Beige Paint On Metal Pipe					
088-PB 8 342109531-0008	6/8/2021	6/18/2021	0.1370 g	0.015 % wt	0.028 % wt
Site: Drywell Level 2 - 4" Vertical Pipe, Green Paint On Metal Pipe					
088-PB 9 342109531-0009	6/8/2021	6/18/2021	0.2982 g	0.0080 % wt	0.024 % wt
Site: Drywell Level 2 - 3" Pipe-In Ceiling, Green Paint On Metal Pipe					
088-PB 10 342109531-0010	6/8/2021	6/18/2021	0.0826 g	0.024 % wt	<0.024 % wt
Site: Drywell Level 2 - Center Of Ceiling, Beige Paint On Concrete					
088-PB 11 342109531-0011	6/8/2021	6/18/2021	0.2992 g	0.080 % wt	2.2 % wt
Site: Drywell Level 2 - 1" Pipe - East Wall, Blue W/Green Paint On Metal Pipe					

Carlos Rivadeneyra, Laboratory Director
 or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
 Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
 Samples analyzed by EMSL Analytical, Inc. Orlando, FL AIHA-LAP, LLC--ELLAP Accredited #183563

Initial report from 06/22/2021 09:27:02





EMSL Analytical, Inc.

3303 PARKWAY CENTER COURT, Orlando, FL 32808
 Phone/Fax (407) 599-5887 / (407) 599-9063
<http://www.EMSL.com> orlandolab@emsl.com

EMSL Order: 342109531
 CustomerID: OCCU56
 CustomerPO:
 ProjectID:

Attn: **Justin Carman** Phone: (813) 626-8156
OHC Environmental Engineering, Inc. Fax: (813) 623-6702
101 South Hoover Blvd Received: 6/17/2021 10:10 AM
Suite 101 Collected: 6/8/2021
Tampa, FL 33609
 Project: 210088 801 West 109th Avenue, Tampa, FL 33612

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	Collected	Analyzed	Weight	RDL	Lead Concentration
088-PB 12 342109531-0012	6/8/2021	6/18/2021	0.2595 g	0.080 % wt	1.5 % wt
Site: Drywell Level 2 - 2" Pipe - West Wall, Grey Paint On Metal Pipe					
088-PB 13 342109531-0013	6/8/2021	6/18/2021	0.0555 g	0.036 % wt	0.21 % wt
Site: Drywell Level 1 - Electrical Cabinet, Grey Paint On Metal Electrical Cabinet					
088-PB 14 342109531-0014	6/8/2021	6/18/2021	0.1767 g	0.011 % wt	<0.011 % wt
Site: Drywell Level 1 - Breaker Box - Southwest Corner, Grey Paint On Metal Breaker Box					
088-PB 15 342109531-0015	6/8/2021	6/18/2021	0.2442 g	0.0082 % wt	0.021 % wt
Site: Drywell Level 1 - Concrete Flooring - Southeast Corner, Grey Paint On Concrete Floor					
088-PB 16 342109531-0016	6/8/2021	6/18/2021	0.1485 g	0.013 % wt	0.024 % wt
Site: Drywell Level 1 - Interior Door Frame, Light Grey Paint On Metal Frame					
088-PB 17 342109531-0017	6/8/2021	6/18/2021	0.1134 g	0.018 % wt	<0.018 % wt
Site: Exterior - Door And Frame, Dark Grey Paint On Metal Doors/Frames					
088-PB 18 342109531-0018	6/8/2021	6/18/2021	0.2880 g	0.0080 % wt	0.058 % wt
Site: Exterior Concrete Wall - North Side, Beige W/Tan Paint On Concrete Wall					
088-PB 19 342109531-0019	6/8/2021	6/18/2021	0.2969 g	0.040 % wt	0.59 % wt
Site: Exterior - Handrails Between Wet Well And Drywell, Yellow Paint On Metal Rails					
088-PB 20 342109531-0020	6/8/2021	6/18/2021	0.1555 g	0.013 % wt	0.014 % wt
Site: Exterior - North Side Of Building - Roof Drop Edge, Grey Paint On Metal					
088-PB 21 342109531-0021	6/8/2021	6/18/2021	0.1445 g	0.014 % wt	0.51 % wt
Site: Drywell Level 1 - Exhaust Motor Cover, Teal Paint On Metal Cover					

Carlos Rivadeneyra, Laboratory Director
 or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
 Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
 Samples analyzed by EMSL Analytical, Inc. Orlando, FL AIHA-LAP, LLC--ELLAP Accredited #163563

Initial report from 06/22/2021 09:27:02





EMSL Analytical, Inc.

3303 PARKWAY CENTER COURT, Orlando, FL 32808
 Phone/Fax (407) 599-5887 / (407) 599-9063
<http://www.EMSL.com> orlandolab@emsl.com

EMSL Order: 342109531
 CustomerID: OCCU56
 CustomerPO:
 ProjectID:

Attn: **Justin Carman** Phone: (813) 626-8156
OHC Environmental Engineering, Inc. Fax: (813) 623-6702
101 South Hoover Blvd Received: 6/17/2021 10:10 AM
Suite 101 Collected: 6/8/2021
Tampa, FL 33609
 Project: 210088 801 West 109th Avenue, Tampa, FL 33612

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	Collected	Analyzed	Weight	RDL	Lead Concentration
088-PB 22 342109531-0022	6/8/2021	6/18/2021	0.1664 g	0.012 % wt	<0.012 % wt
Site: Exterior - Southwest Corner Of The Building - Electrical Meter, Grey Paint On Electrical Box					
088-PB 23 342109531-0023	6/8/2021	6/18/2021	0.2821 g	0.0080 % wt	<0.0080 % wt
Site: Exterior - Southeast Corner Of Property - Valve, Green W/Teal Paint On Metal Pipe					
088-PB 24 342109531-0024	6/8/2021	6/18/2021	0.2752 g	0.0080 % wt	<0.0080 % wt
Site: Wet Well - East Wall, Beige Paint On Concrete Wall					

Carlos Rivadeneyra, Laboratory Director
 or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
 Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
 Samples analyzed by EMSL Analytical, Inc. Orlando, FL AIHA-LAP, LLC--ELLAP Accredited #163563

Initial report from 06/22/2021 09:27:02

Test Report PB w/RDL-2.0.0.0 Printed: 6/22/2021 9:27:02 AM

Page 3 of 3



OrderID: 342109531



OHC Environmental Engineering, Inc.
 101 South Hoover Blvd, Suite 101
 Tampa, FL 33609
 Office: (813) 626-8156

342109531

LEAD SURVEY
CHAIN OF CUSTODY FORM

Send Report to: Justin R. Carrman
 Email Address: jcarrman@ohcnet.com
 Phone #: 813-376-1202
 OHC Project #: 210088
 Project Location: 801 West 109th Avenue, Tampa, FL 33612
 Sampling Date: 06/08/2021
 Sampled by: Justin R. Carrman
 Relinquished Date: 06/13/2021
 Relinquished by (print): Justin R. Carrman
 Relinquished by (sign): [Signature]

Laboratory Name: EMSL-Orlando
 Type of Analysis: FAAS % by weight
 Turnaround Time: 72 hr
 Total # of Samples: 24
FOR LABORATORY USE
 Date/Time Received: 6/17/21 10:10
 Received by (print): AC
 Received by (sign): [Signature]

** Indicate if the sample is a composite under the Description. Existing locations of each sample should be documented on the Observations & Notes sheet. **

Sample ID	Location	Sample Description <i>(include color, material type, substrate, composite, etc.)</i>	Total Quantity
088-PB 1	Drywell Level 3-West Wall	Beige w/ Green Paint on Concrete Wall	Throughout
088-PB 2	Drywell Level 3- Pump 1-8" Pipe	Green w/ Grey Paint on Metal Pipe	20 LF
088-PB 3	Drywell Level 3-Pump 2 Valve	Blue Paint on Metal Valve	8 LF
088-PB 4	Drywell Level 3-Pump 1 Valve	Red Paint on Metal Valve	3 Valves
088-PB 5	Drywell Level 3-Pump 1	Black Paint on Metal Pump	50 SF
088-PB 6	Drywell Level 2-Handrail	Yellow w/ Red Paint on Metal Rails	120 LF
088-PB 7	Drywell Level 2-14" Pipe-Southeast Corner	Green w/ Beige Paint on Metal Pipe	25 LF
088-PB 8	Drywell Level 2-4" Vertical Pipe	Green Paint on Metal Pipe	35 LF
088-PB 9	Drywell Level 2-3" Pipe-In Ceiling	Green Paint on Metal Pipe	45 LF
088-PB 10	Drywell Level 2-Center of Ceiling	Beige Paint on Concrete	1,200 SF
088-PB 11	Drywell Level 2-1" Pipe-East Wall	Blue w/ Green Paint on Metal Pipe	120 LF



APPENDIX E

**CONSULTANT & LABORATORY
CREDENTIALS**

The Board for Global EHS Credentialing (BGC)

through its vested authority, hereby confirms that

Jim F. Rizk

has met all requirements of education, experience, and examination, and on-going maintenance set forth through the BGC's American Board of Industrial Hygiene®'s (ABIH®) credentialing division for re-certification in the Comprehensive Practice of Industrial Hygiene and is thereby conferred the credential of

Certified Industrial Hygienist® (CIH®)

The aforementioned individual is given all rights, privileges, and responsibilities as both a diplomate of the BGC and holder of the CIH credential, provided that the credential is not suspended or revoked, and it is renewed annually. Moreover, the holder must meet all recertification requirements, including the obligation to practice ethically as prescribed by the BGC.



Credential Number: 3956 CP
Award Date: June 30, 1988
Expiration Date: December 1, 2025

Cynthia Hanco, CIH
Chair of the Board of Directors



Ulric K. Chung, MCS, PhD
Chief Executive Officer and Secretary

United States Environmental Protection Agency

This is to certify that

OHC Environmental Engineering, Inc

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories


This certification is valid from the date of issuance and expires April 30, 2021

LBP-2391-1
Certification #
March 13, 2018
Issued On




Michelle Price

Michelle Price, Chief
Lead, Heavy Metals, and Inorganics Branch

 Ron DeSantis, Governor

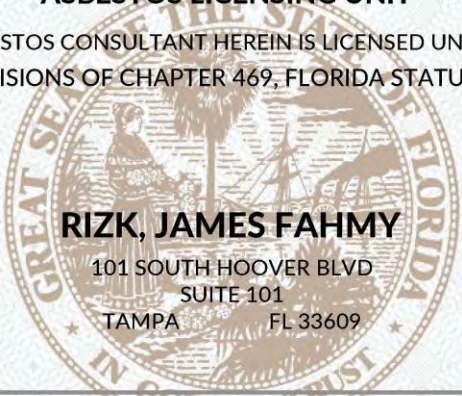
Halsey Beshears, Secretary



STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

ASBESTOS LICENSING UNIT


THE ASBESTOS CONSULTANT HEREIN IS LICENSED UNDER THE
PROVISIONS OF CHAPTER 469, FLORIDA STATUTES


RIZK, JAMES FAHMY
101 SOUTH HOOVER BLVD
SUITE 101
TAMPA FL 33609

LICENSE NUMBER: IA0000022

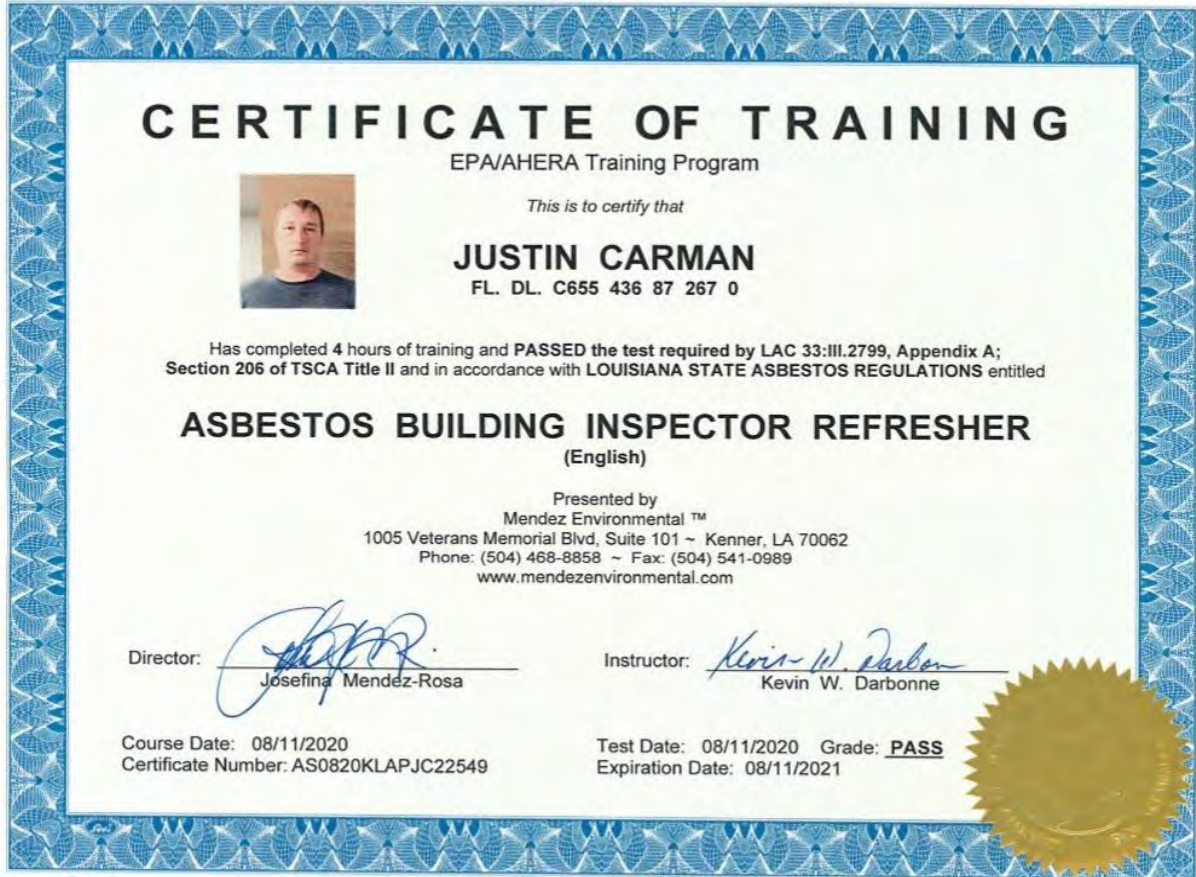
EXPIRATION DATE: NOVEMBER 30, 2022

Always verify licenses online at MyFloridaLicense.com



Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.







**United States Department of Commerce
National Institute of Standards and Technology**

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 600215-0

EMSL Analytical, Inc. - Tampa, FL
Tampa, FL

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2020-10-01 through 2021-09-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101151-0

EMSL Analytical, Inc.
Orlando, FL

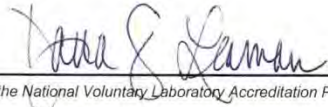
*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2020-07-01 through 2021-06-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program



----- END REPORT -----