

Solicitation 663-11778

Sanitary Sewer Pump Station A-12 Rehabilitation (P11880)

Bid Designation: Public



City of Fort Lauderdale

Bid 663-11778 Sanitary Sewer Pump Station A-12 Rehabilitation (P11880)

Bid Number **663-11778**
 Bid Title **Sanitary Sewer Pump Station A-12 Rehabilitation (P11880)**

Bid Start Date **Jul 28, 2016 10:56:00 AM EDT**
 Bid End Date **Sep 1, 2016 2:00:00 PM EDT**
 Question & Answer End Date **Aug 19, 2016 5:00:00 PM EDT**

Bid Contact **Maureen Lewis**
Procurement Specialist I
Finance
954-828-5239
maureenl@fortlauderdale.gov

Contract Duration **One Time Purchase**
 Contract Renewal **Not Applicable**
 Prices Good for **120 days**
 Pre-Bid Conference **Aug 11, 2016 1:30:00 PM EDT**
Attendance is optional
Location: 900 Avocado Isle
Fort Lauderdale, FL 33315

Bid Comments **Sealed bids will be received electronically until 2:00 p.m., local time, on THURSDAY, SEPTEMBER 1, 2016, and opened immediately thereafter in the 5th Floor Conference Room, City Hall, City of Fort Lauderdale, Florida, 100 North Andrews Avenue, for Bid No., 663-11778, PROJECT NO., 11880, SANITARY SEWER PUMP STATION A-12 REHABILITATION.**

This project consists of Drawing File No., 4-137-14, thirty-five (35) sheets.

The work includes furnishing all labor, equipment, materials and performing all related operations in connection with the rehabilitation of a wet pit/dry pit pump station. The project includes demolition and replacement of mechanical and electrical equipment, piping, pumps and valves, concrete repairs, and cleaning and painting and restoration.

NOTE: Payment on this contract will be made by Visa or MasterCard.

Possession of a Broward County Engineering Contractor's license and/or the appropriate license issued by the State of Florida is required for working within public rights-of-way. Contractor must have proper licensing prior to submitting bid and must submit evidence of same with bid.

A pre-bid meeting and site visit will be held on THURSDAY, AUGUST 11, 2016, at 1:30 p.m., local time, at 900 Avocado Isle, Fort Lauderdale, FL 33315 (pump station location). It is highly recommended that bidders attend the pre-bid meeting and site visit since tours at other times might not be available.

While attendance is not mandatory, it will be the sole responsibility of the bidder to inspect the City's facilities and become familiar with the scope of the City's requirements and systems prior to submitting a proposal. No variation in price or conditions shall be permitted based upon a claim of ignorance. It is strongly suggested that all Contractors attend the pre-bid meeting and site visit.

Bidding blanks may be obtained free of charge at BIDSINC.COM. Drawing Plans are on file in the Public Works Department, City of Fort Lauderdale at 100 North Andrews Avenue, 4th floor, (Monday thru Friday 8:00 am to 4:30 pm) at a NON-REFUNDABLE cost of \$50.00 (including sales tax per set). Only cash or cashier's check made payable to the City of Fort Lauderdale are accepted.

It will be the sole responsibility of the bidder to ensure that his bid is submitted prior to the bid opening date and time listed. **PAPER BID SUBMITTALS WILL NOT BE ACCEPTED. BIDS MUST BE SUBMITTED ELECTRONICALLY VIA BIDSYNC.COM**

Bid Security : A certified check, cashier's check, bank officer's check or bid bond for FIVE percent (5%) of the bid amount, made payable to the City of Fort Lauderdale, Florida, shall accompany each proposal.

Bid Bonds:

Bidders can submit bid bonds for projects four different ways:

BidSync allows bidders to submit bid bonds electronically directly through their system using Surety 2000. For more information on this feature and to access it, contact BIDSYNC customer care department.

Bidders may upload their original executed bid bond on BIDSYNC to accompany their bids with the electronic proposal, and deliver, upon request, the original, signed and sealed hard copy within five (5) business days after bid opening, with the company name, bid number and title clearly indicated.

Bidders can hand deliver their bid bond in a sealed envelope to the Finance Department/Procurement Services Division, 100 North Andrews Avenue, Room 619, Fort Lauderdale, FL 33301-1016, before time of bid opening, with the company name, bid number and title clearly indicated on the envelope.

Bidders can mail their bid bond to the Finance Department/Procurement Services Division, 100 North Andrews Avenue, Room 619, Fort Lauderdale, FL 33301-1016, before time of bid opening, with the company name, bid number and title clearly indicated on the envelope.

Certified Checks, Cashier's Checks and Bank Drafts CANNOT be submitted via BIDSYNC, nor are their images allowed to be uploaded and submitted with your electronic bid. These forms of securities, as well as hard copy bid bonds, must be received on or before the Invitation to Bid (ITB) opening date and time, at the Finance Department/Procurement Services Division, 100 North Andrews Avenue, Room 619, Fort Lauderdale, FL 33301-1016, with the bid number and title clearly indicated on the envelope.

It is the bidder's sole responsibility to ensure that his bid bond or other bid security is received by the Procurement Services Division before time of bid opening. Failure to adhere to this requirement may be grounds to consider the bid as non-responsive.

The City of Fort Lauderdale reserves the right to waive any informality in any or all bids and to reject any or all bids.

For information concerning technical specifications, please utilize the question/answer feature provided by BIDSYNC at www.bidsync.com. Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures, will only be transmitted by written addendum. (See addendum section of BIDSYNC Site). **Contractors please note:** No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Contractor has familiarized himself with the nature and extent of the work, equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation.

Information on bid results and projects currently out to bid can be obtained on the City's website – <http://www.fortlauderdale.gov/purchasing>. For general inquiries, please call (954) 828-5239.

Addendum # 1

New Documents	P11880 FINAL SPECS.pdf P11880.DRAWINGS.20160714.pdf
Removed Documents	P11880.SUBMERSIBLE PUMPS AND MOTORS.3-20-15.docx P11880.DRAWINGS.20160714.pdf P11880.FINAL SPECS.7-15-16.pdf

Item Response Form

Item **663-11778--01-01 - Base Bid Total: Maintenance of Traffic**
Lot Description **Base Bid Total**
Quantity **1 lump sum**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 1

Description

Maintenance of Traffic

Item **663-11778--01-02 - Base Bid Total: Rehabilitation of wastewater pump station, A-12**
Lot Description **Base Bid Total**
Quantity **1 lump sum**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 1

Description

Furnish and install Material, Labor and Equipment for Rehabilitation of wastewater pump station, A-12

Item **663-11778--01-03 - Base Bid Total: 12 DIP Restrained joint forcemain**
Lot Description **Base Bid Total**
Quantity **39 linear foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 39

Description

Furnish and install 12 DIP Restrained joint forcemain

Item **663-11778--01-04 - Base Bid Total: 6 DIP Restrained joint forcemain**
Lot Description **Base Bid Total**
Quantity **15 linear foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 15

Description

Furnish and install 6 DIP Restrained joint forcemain

Item **663-11778--01-05 - Base Bid Total: Additional by-pass pumping**
Lot Description **Base Bid Total**
Quantity **45 day**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 45

Description

Additional bypass pumping

Item **663-11778--01-06 - Base Bid Total: 8 CIPP mainline liner**
Lot Description **Base Bid Total**
Quantity **35 linear foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 35

Description

Furnish and install 8 CIPP mainline liner in CI main

Item **663-11778--01-07 - Base Bid Total: 8 CIPP mainline liner x 1.5 mm thickness increase**
Lot Description **Base Bid Total**
Quantity **35 linear foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 35

Description

Furnish and install 8 CIPP mainline liner x 1.5mm thickness increase in CI main

Item **663-11778--01-08 - Base Bid Total: 16 CIPP mainline liner**
Lot Description **Base Bid Total**
Quantity **32 linear foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
Fort Lauderdale FL 33301
Qty 32

Description

Furnish and install 16 CIPP mainline liner in CI main

Item **663-11778--01-09 - Base Bid Total: 16 CIPP mainline liner x 1.5 mm thickness increase**
 Lot Description **Base Bid Total**
 Quantity **32 linear foot**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
 Fort Lauderdale FL 33301
Qty 32

Description

Furnish and install 16 CIPP mainline liner x 1.5mm thickness increase in CI main

Item **663-11778--01-10 - Base Bid Total: 8 mechanical turberculution removal**
 Lot Description **Base Bid Total**
 Quantity **35 linear foot**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
 Fort Lauderdale FL 33301
Qty 35

Description

Mechanical turberculution removal (8)

Item **663-11778--01-11 - Base Bid Total: 16 mechanical turberculution removal**
 Lot Description **Base Bid Total**
 Quantity **32 linear foot**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
 Fort Lauderdale FL 33301
Qty 32

Description

Mechanical turberculution removal (16)

Item **663-11778--01-12 - Base Bid Total: Grout visible infiltration (8 and 14 deep manholes)**
 Lot Description **Base Bid Total**
 Quantity **5 gallon**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
[See ITB Specifications](#)
 Fort Lauderdale FL 33301
Qty 5

Description

Grouting for visible infiltration in manholes (two manholes; 8 and 14 deep)

Item **663-11778--01-13 - Base Bid Total: Repair manhole benches and inverts (two manholes)**

CAM 16-1224
 EXHIBIT 4
 Page 6 of 663

Lot Description **Base Bid Total**
 Quantity **2 each**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
 [See ITB Specifications](#)
 See ITB Specifications
 Fort Lauderdale FL 33301
 Qty 2

Description

Repair manhole benches and inverts (two manholes)

Item **663-11778--01-14 - Base Bid Total: IET manhole coating/liner (14 deep manhole)**
 Lot Description **Base Bid Total**
 Quantity **14 vertical foot**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
 [See ITB Specifications](#)
 See ITB Specifications
 Fort Lauderdale FL 33301
 Qty 14

Description

Provide and install IET manhole coating/liner (14 deep manhole)

Item **663-11778--01-15 - Base Bid Total: Additional foundation stabilization/imported backfill**
 Lot Description **Base Bid Total**
 Quantity **45 cubic yard**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
 [See ITB Specifications](#)
 See ITB Specifications
 Fort Lauderdale FL 33301
 Qty 45

Description

Furnish and install additional foundation stabilization or imported backfill material.

Item **663-11778--01-16 - Base Bid Total: DIP forcemain fittings**
 Lot Description **Base Bid Total**
 Quantity **500 pound**
 Unit Price
 Delivery Location **City of Fort Lauderdale**
 [See ITB Specifications](#)
 See ITB Specifications
 Fort Lauderdale FL 33301
 Qty 500

Description

Furnish and install Ductile Iron Pipe (DIP) Forcemain Fittings

Item **663-11778--01-17 - Base Bid Total: Wet Well Rehab (a)**
 Lot Description **Base Bid Total**

Quantity **200 square foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 200

Description

Structural surface deterioration, no exposed rebar

Item **663-11778--01-18 - Base Bid Total: Wet Well Rehab (b)**
Lot Description **Base Bid Total**
Quantity **350 square foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 350

Description

Additional cost to Item 3-a to repair deterioration with exposed rebar

Item **663-11778--01-19 - Base Bid Total: Wet Well Rehab (c)**
Lot Description **Base Bid Total**
Quantity **350 square foot**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 350

Description

Additional cost to Items 3-a and 3-b to repair deterioration with exposed and deteriorated rebar.

Item **663-11778--01-20 - Base Bid Total: 1.5 asphalt concrete**
Lot Description **Base Bid Total**
Quantity **70 square yard**
Unit Price
Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 70

Description

Furnish and place 1.5 thick asphalt concrete pavement, Type S-3

Item **663-11778--01-21 - Base Bid Total: 1 asphalt mill and resurface**
Lot Description **Base Bid Total**
Quantity **448 square yard**

Unit Price

Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 448

Description

Mill up to 1 asphalt and place 1 thick asphalt concrete pavement, Type S-1

Item **663-11778--01-22 - Base Bid Total: 12 limerock base course**

Lot Description **Base Bid Total**

Quantity **25 square yard**

Unit Price

Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 25

Description

Furnish and place 12 limerock base course

Item **663-11778--01-23 - Base Bid Total: Re-grade swale**

Lot Description **Base Bid Total**

Quantity **330 square yard**

Unit Price

Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 330

Description

Strip and re-grade swale

Item **663-11778--01-24 - Base Bid Total: Sod**

Lot Description **Base Bid Total**

Quantity **330 square yard**

Unit Price

Delivery Location **City of Fort Lauderdale**
[See ITB Specifications](#)
See ITB Specifications
Fort Lauderdale FL 33301
Qty 330

Description

Restore sod

Item **663-11778--01-25 - Base Bid Total: 6 thick concrete sidewalk**

Lot Description **Base Bid Total**

Quantity **30 linear foot**

Unit Price

Delivery Location

City of Fort Lauderdale[See ITB Specifications](#)

See ITB Specifications

Fort Lauderdale FL 33301

Qty 30**Description**

Remove and replace 6 concrete sidewalk

Item

663-11778--01-26 - Base Bid Total: 6 x 16 concrete curb

Lot Description

Base Bid Total

Quantity

30 linear foot

Unit Price

Delivery Location

City of Fort Lauderdale[See ITB Specifications](#)

See ITB Specifications

Fort Lauderdale FL 33301

Qty 30**Description**

Remove and replace 6x 16 concrete curb

**CITY OF FORT LAUDERDALE
CONTRACT AND SPECIFICATIONS PACKAGE**

BID NO. 663-11778

PROJECT NO. 11880

**SANITARY SEWER PUMP
STATION A-12
REHABILITATION**



**Issued on Behalf of: The Public Works Department
100 North Andrews Avenue
Fort Lauderdale, Florida 33301**

**STAN EDWARDS, P.E.
PROJECT ENGINEER**

**MAUREEN LEWIS
PROCUREMENT SPECIALIST I
Telephone: (954) 828-5239 E-mail: maureenl@fortlauderdale.gov**

TABLE OF CONTENTS

<u>Description</u>	<u>Pages</u>
I. BID INFORMATION	
Invitation to Bid	ITB-1 thru ITB-2
Instruction to Bidders	IB-1 thru IB-6
Special Conditions	SC-1 thru SC-7
II. PROPOSAL	
Construction Bid Certification	CBC-1
Questionnaire Sheets.....	CITB QS-1 thru QS-2
III. CONTRACTOR IDENTIFICATION	
Prime Contractor Identification Form	CITB MBE-1 thru MBE-2
Non-Collusion Statement	CITB NCS-1
Trench Safety.....	CITB TS-1
Contract Payment Method.....	CITB CPM-1
IV. CONSTRUCTION AGREEMENT (SAMPLE)	C-1 thru C-38
V. GENERAL CONDITIONS	GC-1 thru GC-10
VI. SPECIFICATIONS	
DIVISION 1 - GENERAL REQUIREMENTS	
01001 General Requirements.....	11
01005 Intent of Drawings and Specifications	1
01010 Summary of Work	1
01025 Measurement and Payment.....	16
01040 Coordination	9
01300 Submittals.....	10
Transmittal of Contractor's Submittal	
01311 Construction Schedules	5
01430 Operation and Maintenance Data	9
Maintenance Summary Form	
01500 Construction Facilities and Temporary Controls.....	15
Supplements 1 & 2 (Project Sign Information).....	2
Supplement 3 (Temporary MOT Routing Form).....	2
Supplement 4 (Door Hanger Notification).....	1
Supplement 5 (Staging Area Ordinance).....	8
01540 Demolition and Removal of Existing Structures and Equipment.....	6
01590 Project Sign	2
01600 Material and Equipment.....	6
01640 Manufacturers' Services.....	6
Manufacturer's Certificate of Proper Installation	

TABLE OF CONTENTS (continued)

<u>Description</u>	<u>Pages</u>
DIVISION 1 – (cont'd)	
01780 Contract Closeout.....	6
Supplement – 1, Subcontractor Identification Form	
01810 Equipment Testing and Facility Startup.....	6
DIVISION 2 - SITE CONSTRUCTION	
02200 Site Preparation.....	4
02240 Dewatering	5
02250 Affected Soil and Liquid Disposal.....	4
02260 Excavation Support and Protection	1
02315 Fill and Backfill.....	5
02316 Excavation	3
02319 Subgrade Preparation.....	2
02320 Trench Backfill	6
02500 Conveyance Piping - General	12
02502 Ductile Iron Pipe and Fittings	4
02509 PVC Pressure Pipe and Fittings.....	3
02518 Water Service Connections	7
02533 Manholes	12
02575 Surface Restoration	12
02632 Storm Drain and Sanitary Sewer Piping.....	12
02632-03Polyvinyl Chloride (PVC)	1
02632-05Reinforced Concrete	2
02655 Non-Structural Manhole Lining.....	5
02656 Manhole Repairs.....	5
02710 Limerock Base	4
02726 Wet Well and Vault Construction	8
02751 Cleaning	3
02761 Pavement Marking.....	5
02765 Cured-in-Place Pipe Lining	13
02771 Concrete Curbs and Sidewalks.....	4
02772 Asphalt Concrete Pavement	7
02958 Structural Manhole Lining	4
02958-01 IET Coating System	2
02958-02 Raven Coating System.....	6
DIVISION 3 - CONCRETE	
03200 Concrete Reinforcement.....	7
03300 Cast-in-Place Concrete.....	22
03301 Reinforced Concrete.....	6
03600 Grout.....	8
03720 Concrete Surface Repair Systems and Hydrogen Sulphide Liner.....	6
03740 Modifications to Existing Concrete.....	4
DIVISION 4 (NOT USED)	

TABLE OF CONTENTS (continued)

<u>Description</u>	<u>Pages</u>
DIVISION 5 – METALS	
05500 Metal Fabrications and Castings.....	12
05515 Aluminum Ladders and Accessories.....	3
DIVISION 6 (NOT USED)	
DIVISION 8 (NOT USED)	
DIVISION 9 - FINISHES	
099610 Paint Coatings.....	15
DIVISION 11—EQUIPMENT	
11305 Submersible Pumps.....	11
Pump Data Sheets	
DIVISIONS 12 THROUGH 14 (NOT USED)	
DIVISION 15—MECHANICAL	
15100 Valves and Operators	9
DIVISION 16 - ELECTRICAL	
16010 Electrical General Requirements.....	10
16150 Motors.....	7
16416 Manual Transfer Switches.....	7
16470 Panel Boards.....	5
16950 Electrical Testing.....	2
16960 Lift Station Control Cabinet.....	11
DIVISION 26 - ELECTRICAL	
260500 Basic Electrical Material and Methods	9
260519 Low Voltage Electrical Power Conductors and Cables	5
260526 Grounding and Bonding.....	7
260533 Raceway and Boxes	11
260553 Identification for Electrical Systems	8
262816 Enclosed Switches.....	9
Appendices	
Appendix 1 Broward County Sanitary Sewer Permit	9
Appendix 2 Pump Station A-12 Lead and Asbestos Report	48

TABLE OF CONTENTS (continued)

Note: The following documents are available electronically for completion.

- Attachment 1 - CITB Construction Bid Certification (formerly CITB Signature Page)
- Attachment 2 - CITB Questionnaire Sheets (formerly P-4 to P-5)
- Attachment 3 - CITB Trench Safety (formerly P-6)
- Attachment 5 - CITB Prime Contractor ID Form (MBE-1 & 2)
- Attachment 6 - CITB Non-Collusion Statement (NCS-1)
- Attachment 7 - CITB Contract Payment Method
- Electrical Schedule of Values (SOV)
- Submersible Pumps and Motors (SPM)

These documents must be returned with your bid along with your bid security, proof of insurance, and proof of required licenses/certifications.

INVITATION TO BID

Sealed bids will be received electronically until 2:00 p.m., local time, on **THURSDAY, SEPTEMBER 1, 2016**, and opened immediately thereafter in the 5th Floor Conference Room, City Hall, City of Fort Lauderdale, Florida, 100 North Andrews Avenue, for **Bid No., 663-11778, PROJECT NO., 11880, SANITARY SEWER PUMP STATION A-12 REHABILITATION.**

This project consists of Drawing File No., **4-137-14, thirty-five (35)** sheets.

The work includes furnishing all labor, equipment, materials and performing all related operations in connection with the rehabilitation of a wet pit/dry pit pump station. The project includes demolition and replacement of mechanical and electrical equipment, piping, pumps and valves, concrete repairs, and cleaning and painting and restoration.

NOTE: Payment on this contract will be made by Visa or MasterCard.

Possession of a Broward County Engineering Contractor's license and/or the appropriate license issued by the State of Florida is required for working within public rights-of-way. Contractor must have proper licensing prior to submitting bid and must submit evidence of same with bid.

A pre-bid meeting and site visit will be held on THURSDAY, AUGUST 11, 2016, at 1:30 p.m., local time, at 900 Avocado Isle, Fort Lauderdale, FL 33315 (pump station location). It is highly recommended that bidders attend the pre-bid meeting and site visit since tours at other times might not be available.

While attendance is not mandatory, it will be the sole responsibility of the bidder to inspect the City's facilities and become familiar with the scope of the City's requirements and systems prior to submitting a proposal. No variation in price or conditions shall be permitted based upon a claim of ignorance. It is strongly suggested that all Contractors attend the pre-bid meeting and site visit.

Bidding blanks may be obtained **free of charge** at BIDSYNC.COM. Drawing Plans are on file in the Public Works Department, City of Fort Lauderdale at 100 North Andrews Avenue, 4th floor, (Monday thru Friday 8:00 am to 4:30 pm) at a **NON-REFUNDABLE cost of \$50.00 (including sales tax per set)**. Only cash or cashier's check made payable to the City of Fort Lauderdale are accepted.

It will be the sole responsibility of the bidder to ensure that his bid is submitted prior to the bid opening date and time listed. **PAPER BID SUBMITTALS WILL NOT BE ACCEPTED. BIDS MUST BE SUBMITTED ELECTRONICALLY VIA BIDSYNC.COM**

Bid Security: A certified check, cashier's check, bank officer's check or bid bond for **FIVE** percent (5%) of the bid amount, made payable to the City of Fort Lauderdale, Florida, shall accompany each proposal.

Bid Bonds:

Bidders can submit bid bonds for projects four different ways:

- 1) BidSync allows bidders to submit bid bonds electronically directly through their system using **Surety 2000**. For more information on this feature and to access it, contact BIDSYNC customer care department.
- 2) Bidders may **upload** their original executed bid bond on BIDSYNC to accompany their bids with the electronic proposal, and deliver, upon request,

INVITATION TO BID (continued)

the original, signed and sealed hard copy within five (5) business days after bid opening, with the company name, bid number and title clearly indicated.

- 3) Bidders can **hand deliver** their bid bond in a sealed envelope to the Finance Department/Procurement Services Division, 100 North Andrews Avenue, Room 619, Fort Lauderdale, FL 33301-1016, before time of bid opening, with the company name, bid number and title clearly indicated on the envelope.
- 4) Bidders can **mail** their bid bond to the Finance Department/Procurement Services Division, 100 North Andrews Avenue, Room 619, Fort Lauderdale, FL 33301-1016, before time of bid opening, with the company name, bid number and title clearly indicated on the envelope.

Certified Checks, Cashier's Checks and Bank Drafts CANNOT be submitted via BIDSYNC, nor are their images allowed to be uploaded and submitted with your electronic bid. These forms of securities, as well as hard copy bid bonds, must be received on or before the Invitation to Bid (ITB) opening date and time, at the Finance Department/Procurement Services Division, 100 North Andrews Avenue, Room 619, Fort Lauderdale, FL 33301-1016, with the bid number and title clearly indicated on the envelope.

It is the bidder's sole responsibility to ensure that his bid bond or other bid security is received by the Procurement Services Division before time of bid opening. Failure to adhere to this requirement may be grounds to consider the bid as non-responsive.

The City of Fort Lauderdale reserves the right to waive any informality in any or all bids and to reject any or all bids.

For information concerning technical specifications, please utilize the question/answer feature provided by BIDSYNC at www.bidsync.com. Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures, will only be transmitted by written addendum. (See addendum section of BIDSYNC Site). **Contractors please note:** No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Contractor has familiarized himself with the nature and extent of the work, equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation.

Information on bid results and projects currently out to bid can be obtained on the City's website – <http://www.fortlauderdale.gov/purchasing>. For general inquiries, please call (954) 828-5239.

Jeffrey A. Modarelli
City Clerk

INSTRUCTIONS TO BIDDERS

The following instructions are given for the purpose of guiding bidders in properly preparing their bids or proposals. These directions have equal force and weight with the specifications and strict compliance is required with all of these provisions.

QUALIFICATIONS OF BIDDERS – No proposal will be accepted from, nor will any contract be awarded to, any person who is in arrears to the CITY OF FORT LAUDERDALE, upon any debt or contract, or who has defaulted, as surety or otherwise, upon any obligation to the City, or who is deemed irresponsible or unreliable by the City Commission of Fort Lauderdale.

PERSONAL INVESTIGATION - Bidders shall satisfy themselves by personal investigation, and by such other means as they may think necessary or desirable, as to the conditions affecting the proposed work and the cost. No information derived from maps, plans, specifications, or from the Engineer, City Manager, or their assistants shall relieve the Contractor from any risk or from fulfilling all terms of the contract.

INCONSISTENCIES – Any seeming inconsistency between different provisions of the plans, specifications, proposal or contract, or any point requiring explanation must be inquired into by the bidder, in writing, at least ten (10) days prior to the time set for opening proposals. After proposals are opened, the bidders shall abide by the decision of the Engineer as to such interpretation.

ADDENDA AND INTERPRETATIONS - No interpretations of the meaning of the plans, specifications or other contract documents will be made orally to any bidder. Prospective bidders must request such interpretation in writing as instructed in the bid package. To be considered, such request must be received by the Questions and Answers deadline as indicated in BIDSYNC.COM. Material changes, if any, to the scope of services or bidding procedures will only be transmitted by written addendum. **It is the bidder's responsibility to verify if addendums have been issued in BIDSYNC.COM.** Failure of any bidder to receive any such addenda or interpretation shall not relieve any bidder from any obligation under his bid as submitted. All addenda so issued shall become a part of the contract document. **Bidder** shall verify **in BIDSYNC.COM** that he has all addenda before submitting a bid.

LEGAL CONDITIONS - Bidders are notified to familiarize themselves with the provisions of the laws of the State of Florida relating to hours of labor on municipal work, and with the provisions of the laws of the State of Florida and the Charter and the ordinances of the City of Fort Lauderdale.

PUBLIC ENTITY CRIMES - 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, Florida Statutes, for CATEGORY TWO for a period of thirty-six (36) months from the date of being placed on the convicted vendor list.

FORMS OF PROPOSALS - Each proposal and its accompanying statements must be made on the blanks provided. **THE FORMS MUST BE SUBMITTED ELECTRONICALLY, IN GOOD ORDER WITH ALL BLANKS COMPLETED,** and must show the name of the bidder and a statement as to its contents.

INSTRUCTIONS TO BIDDERS (continued)

FORMS OF PROPOSALS (CONTINUED) - The proposal must be signed by one duly authorized to do so, and in case signed by a deputy or subordinate, the principal's properly written authority to such deputy or subordinate must accompany the proposal. No proposal will be accepted, for any reason whatsoever, which is not submitted to the City as stated above, within the specified time.

INSURANCE - Contractor shall provide and shall require all of its sub-contractors to provide, pay for, and maintain in force at all times during the term of the Agreement, such insurance, including Property Insurance (Builder's Risk), Commercial General Liability Insurance, Business Automobile Liability Insurance, Workers' Compensation Insurance, Employer's Liability Insurance, and Umbrella/Excess Liability, as stated below. Such policy or policies shall be issued by companies authorized to do business in the State of Florida and having agents upon whom service of process may be made in the State of Florida.

BID BOND - A certified check, cashier's check or bank officer's check, for the sum set forth in the advertisement, made payable to the City of Fort Lauderdale, Florida, or bid bond in such amount, shall accompany each proposal as evidence of the good faith and responsibility of the bidder. The check or bond shall be retained by the City as liquidated damages should the bidder refuse to or fail to enter into a contract for the execution of the work embraced in this proposal, in the event the proposal of the bidder is accepted. Retention of such amount shall not be construed as a penalty or forfeiture.

The above bond or check shall be a guarantee that the bidder will, if necessary, promptly execute a satisfactory contract and furnish good and sufficient bonds. As soon as a satisfactory contract has been executed and the bonds furnished and accepted, the check or bond accompanying the proposal of the successful bidder will be returned to him. The certified or other checks or bid bonds of the unsuccessful bidders will be returned to them upon the acceptance of the bid of the successful bidder. If the successful bidder shall not enter into, execute, and deliver such a contract and furnish the required bonds within ten (10) days after receiving notice to do so, the certified or other check or bid bond shall immediately become the property of the City of Fort Lauderdale as liquidated damages. Retention of such amount shall not be construed as a penalty or forfeiture.

FILLING IN BIDS - All prices must be electronically submitted in the proposal pages, and all proposals must fully cover all items for which proposals are asked and no other. Bidders are required to state the names and places of residence of all persons interested, and if no other person is interested, the bidder shall distinctly state such fact and shall state that the proposal is, in all respects, fair and without collusion or fraud. Where more than one person is interested, it is required that all persons interested or their legal representative make all verification and subscribe to the proposal.

PRICES QUOTED: Deduct any discount offered and quote firm net unit prices. In the case of a discrepancy in computing the amount of the bid, the unit price quoted will govern. All prices quoted shall be F.O.B. destination, freight prepaid (Bidder pays and bears freight charges, Bidder owns goods in transit and files any claims), unless otherwise stated in Special Conditions. Each item must be bid separately. No attempt shall be made to tie any item or items contained in the ITB with any other business with the City.

BIDS FIRM FOR ACCEPTANCE: Bidder warrants, by virtue of bidding, that his bid and the prices quoted in his bid will be firm for acceptance by the City for a period of one hundred and twenty (120) days from the date of bid opening unless otherwise stated in the ITB. The City shall award contract within this time period or shall request to the recommended awarded vendor an extension to hold pricing, until products/services have been awarded.

ADDITIONAL ITEMS OR SERVICES: The City may require additional items or services of a similar nature, but not specifically listed in the contract. The Contractor agrees to provide such items or

INSTRUCTIONS TO BIDDERS (continued)

services, and shall provide the City prices on such additional items or services based upon a formula or method, which is the same or similar to that used in establishing the prices in his proposal. If the price(s) offered are not acceptable to the City, and the situation cannot be resolved to the satisfaction of the City, the City reserves the right to procure those items or services from other vendors, or to cancel the contract upon giving the Contractor thirty (30) days written notice.

DELETION OR MODIFICATION OF SERVICES: The City reserves the right to delete any portion of the Contract at any time without cause, and if such right is exercised by the City, the total fee shall be reduced in the same ratio as the estimated cost of the work deleted bears to the estimated cost of the work originally planned. If work has already been accomplished on the portion of the Contract to be deleted, the Contractor shall be paid for the deleted portion on the basis of the estimated percentage of completion of such portion.

If the Contractor and the City agree on modifications or revisions to the task elements, after the City has approved work to begin on a particular task or project, and a budget has been established for that task or project, the Contractor will submit a revised budget to the City for approval prior to proceeding with the work.

CAUSES FOR REJECTION - No proposal will be canvassed, considered or accepted which, in the opinion of the City Commission, is informal or unbalanced, or contains inadequate or unreasonable prices for any items; each item must carry its own proportion of the cost as nearly as is practicable. Any alteration, erasure, interlineation, or failure to specify bids for all items called for in the schedule shall render the proposal informal.

REJECTION OF BIDS - The City reserves the right to reject any bid if the evidence submitted by the bidder, or if the investigation of such bidder, fails to satisfy the City that such bidder is properly qualified to carry out the obligations and to complete the work contemplated. Any or all proposals will be rejected, if there is reason to believe that collusion exists among bidders. A proposal will be considered irregular and may be rejected, if it shows 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.

BID PROTEST PROCEDURE: Any proposer or bidder who is not recommended for award of a contract and who alleges a failure by the City to follow the City's procurement ordinance or any applicable law may protest to the Procurement Division – Deputy Director of Finance, by delivering a letter of protest within five (5) days after a Notice of Intent to award is posted on the City's website at the following link: http://www.fortlauderdale.gov/purchasing/notices_of_intent.htm. The complete protest ordinance may be found on the City's website at the following link: <http://www.fortlauderdale.gov/purchasing/protestordinance.pdf>

WITHDRAWALS - Any bidder may, without prejudice to himself, withdraw his proposal at any time prior to the expiration of the time during which proposals may be submitted. Such request for withdrawal must be in writing and signed in the same manner and by the same person who signed the proposal. After expiration of the period for receiving proposals, no proposal can be withdrawn, modified, or explained.

INSTRUCTIONS TO BIDDERS (continued)

CONTRACT - The bidder to whom award is made shall execute a written contract to do the work and maintain the same in good repair until final acceptance by the proper authorities, and shall furnish good and sufficient bonds as specified within ten (10) days after receiving such contract for execution. If the bidder to whom the first award is made fails to enter into a contract as provided, the award may be annulled and the contract let to the next lowest bidder who is reliable, responsible, and responsive in the opinion of the City Commission, and that bidder shall fulfill every stipulation and obligation as if such bidder were the original party to whom award was made.

The contract shall provide that the Contractor agrees to correct any defective or faulty work or material, which may appear within one (1) year after completion of the work and receipt of final payment.

ENFORCEMENT OF SPECIFICATIONS - Copies of the specifications will be placed in the hands of all the assistants to the Engineer and Inspectors employed on the work, who shall enforce each and every requirement of the contract. Such assistants shall have no authority to vary from such requirements.

COPIES OF DRAWING PLANS - Copies of the drawing plans are on file in the Public Works Department, City Hall, 4th Floor, 100 N. Andrews Avenue, Fort Lauderdale, Florida 33301.

SURETY BOND – The Contractor shall execute and record in the public records of Broward County, Florida, a payment and performance bond in an amount at least equal to the Contract Price with a surety insurer authorized to do business in the State of Florida as surety, ("Bond"), in accordance with Section 255.05, Florida Statutes (2014), as may be amended or revised, as security for the faithful performance and payment of all of the Contractor's obligations under the Contract Documents.

The successful bidder shall furnish a performance and payment bond in compliance with Section 255.05, Florida Statutes, written by a Corporate Surety company, holding a Certificate of Authority from the Secretary of the Treasury of the United States as acceptable sureties on federal bonds, in an amount equal to the total amount payable by the terms of the contract, executed and issued by a Resident Agent licensed by and having an office in the State of Florida, representing such Corporate Surety, conditioned for the due and faithful performance of the work, and providing in addition to all other conditions, that if the Contractor, or his or its subcontractors, fail to duly pay for any labor, materials, or other supplies used or consumed by such Contractor, or his or its subcontractor or subcontractors, in performance of the work contracted to be done, the Surety will pay the same in the amount not exceeding the sum provided in such bonds, together with interest at the rate of fifteen percent (15%) per annum, and that they shall indemnify and save harmless the City of Fort Lauderdale to the extent of any and all payments in connection with carrying out of the contract, which the City may be required to make under the law.

The Contractor is required at all times to have a valid surety bond in force covering the work being performed. A failure to have such bond in force at any time shall constitute a default on the part of the Contractor. A bond written by a surety, which becomes disqualified to do business in the State of Florida, shall automatically constitute a failure on the part of the Contractor to meet the above requirements.

Such bond shall continue in effect for one (1) year after completion and acceptance of the work with liability equal to at least twenty-five percent (25%) of contract price, or an additional bond shall be conditioned that the Contractor will correct any defective or faulty work or material which appear within one (1) year after completion of the contract, upon notification by the City, except in contracts which are concerned solely with demolition work, in which cases twenty-five percent (25%) liability will not be applicable.

INSTRUCTIONS TO BIDDERS (continued)

AUDIT OF CONTRACTOR'S RECORDS - Upon execution of the Contract, the City reserves the right to conduct any necessary audit of the Contractor's records. Such an audit, or audits, may be conducted by the City or its representatives at any time prior to final payment, or thereafter, for a period up to three (3) years. The City may also require submittal of the records from either the Contractor, the Subcontractor, or both. For the purpose of this Section, records shall include all books of account, supporting documents and papers deemed necessary by the City to assure compliance with the contract provisions.

Failure of the Contractor or Subcontractor to comply with these requirements may result in disqualification or suspension from bidding for future contracts or disapproval as a Subcontractor at the option of the City.

The Contractor shall assure that each of its Subcontractors will provide access to its records pertaining to the project upon request by the City.

PERIODIC ESTIMATE FOR PARTIAL PAYMENT - After the Contractor has submitted a periodic estimate for partial payment, approved and certified by the Public Works Department, the City shall make payment in the manner provided in the Contract Documents and in accordance with Florida's Prompt Payment Act, Section 218, Florida Statutes.

RESERVATION FOR AWARD AND REJECTION OF BIDS - The City reserves the right to accept or reject any or all bids, part of bids, and to waive minor irregularities or variations to specifications contained in bids, and minor irregularities in the bidding process. The City also reserves the right to award the contract on a split order basis, lump sum basis, individual item basis, or such combination as shall best serve the interest of the City. The City reserves the right to make an award to the responsive and responsible bidder whose product or service meets the terms, conditions, and specifications of the ITB and whose bid is considered to best serve the City's interest. In determining the responsiveness of the offer and the responsibility of the Bidder, the following shall be considered when applicable: the ability, capacity and skill of the Bidder to perform as required; whether the Bidder can perform promptly, or within the time specified, without delay or interference; the character, integrity, reputation, judgment, experience and efficiency of the Bidder; the quality of past performance by the Bidder; the previous and existing compliance by the Bidder with related laws and ordinances; the sufficiency of the Bidder's financial resources; the availability, quality and adaptability of the Bidder's supplies or services to the required use; the ability of the Bidder to provide future maintenance, service or parts; the number and scope of conditions attached to the bid.

MINORITY AND WOMEN BUSINESS ENTERPRISE PARTICIPATION AND BUSINESS - It is the desire of the City of Fort Lauderdale to increase the participation of minority (MBE) and women-owned (WBE) businesses in its contracting and procurement programs. While the City does not have any preference or set aside programs in place, it is committed **to a policy of equitable participation for these firms**. The City of Fort Lauderdale wants to increase the participation of Minority Business Enterprises (MBE), Women Business Enterprises (WBE), and Small Business Enterprises (SBE) in its procurement activities. If your firm qualifies in accordance with the below definitions please indicate in the space provided in this ITB.

Minority Business Enterprise (MBE) "A Minority Business" is a business enterprise that is owned or controlled by one or more socially or economically disadvantaged persons. Such disadvantage may arise from cultural, racial, chronic economic circumstances or background or other similar cause. Such persons include, but are not limited to: Blacks, Hispanics, Asian Americans, and Native Americans.

INSTRUCTIONS TO BIDDERS (continued)

The term "Minority Business Enterprise" means a business at least 51 percent of which is owned by minority group members or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned by minority group members. For the purpose of the preceding sentence, minority group members are citizens of the United States who include, but are not limited to: Blacks, Hispanics, Asian Americans, and Native Americans.

Women Business Enterprise (WBE) a "Women Owned or Controlled Business" is a business enterprise at least fifty-one percent (51%) of which is owned by females or, in the case of a publicly owned business, at least fifty-one percent (51%) of the stock of which is owned by females.

Small Business Enterprise (SBE) "Small Business" means a corporation, partnership, sole proprietorship, or other legal entity formed for the purpose of making a profit, which is independently owned and operated, has either fewer than 100 employees or less than \$1,000,000 in annual gross receipts.

BLACK includes persons having origins in any of the Black racial groups of Africa.

WHITE includes persons whose origins are Anglo-Saxon and Europeans and persons of Indo-European decent including Pakistani and East Indian.

HISPANIC includes persons of Mexican, Puerto Rican, Cuban, Central and South American, or other Spanish culture or origin, regardless of race.

NATIVE AMERICAN includes persons whose origins are American Indians, Eskimos, Aleuts, or Native Hawaiians.

ASIAN AMERICAN includes persons having origin in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.

DEBARRED OR SUSPENDED BIDDERS OR PROPOSERS - The bidder or proposer certifies, by submission of a response to this solicitation, that neither it nor its principals and subcontractors are presently debarred or suspended by any Federal department or agency.

PROJECT 11880

SPECIAL CONDITIONS**01. PURPOSE**

The City of Fort Lauderdale, Florida (City) is seeking bids from qualified bidders, hereinafter referred to as the Contractor, to provide demolition and replacement (of mechanical and electrical equipment) services for the City's Public Works Department, in accordance with the terms, conditions, and specifications contained in this Invitation To Bid (ITB).

02. TRANSACTION FEES

The City of Fort Lauderdale uses BidSync (www.bidsync.com) to distribute and receive bids and proposals. There is no charge to vendors/contractors to register and participate in the solicitation process, nor will any fees be charged to the awarded contractor.

03. SUBMISSION OF BIDS

It is the sole responsibility of the Contractor to ensure that their bid is submitted electronically through BidSync at www.bidsync.com and that any bid security not submitted via BidSync reaches the City of Fort Lauderdale City Hall, Procurement Services Division, 6th floor, Room 619, 100 N. Andrews Avenue, Fort Lauderdale, FL 33301 in a sealed envelope marked on the outside with the ITB solicitation number and Contractor's name, no later than the time and date specified in this solicitation. **PAPER BID SUBMITALS WILL NOT BE ACCEPTED. PLEASE SUBMIT YOUR BID RESPONSE ELECTRONICALLY.**

04. INFORMATION OR CLARIFICATION

For information concerning procedures for responding to this solicitation, contact Maureen Lewis, Procurement Specialist I, at (954) 828-5239, or email at maureenl@fortlauderdale.gov. Such contact shall be for clarification purposes only.

For information concerning technical specifications, please utilize the question/answer feature provided by BidSync at www.bidsync.com. Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures will only be transmitted by written addendum. (See addendum section of BidSync Site). **Contractors please note:** No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Contractor has familiarized himself with the nature and extent of the work, and the equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation. The

SPECIAL CONDITIONS (continued)

PROJECT 11880

questions and answers submitted in BidSync shall become part of any contract that is created from this ITB.

05. CONTRACT PERIOD

- 5.1 The Contractor recognizes that TIME IS OF THE ESSENCE. The Work shall commence within 30 calendar days of the date of the Notice to Proceed.
- 5.2 The Work shall be Substantially Completed within 217 calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.
- 5.3 The Work shall be finally completed on the Final Completion Date and ready for final payment in accordance with this Agreement within 279 calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.

The City of Fort Lauderdale reserves the right to waive any informality in any bid and to reject any or all bids. The City of Fort Lauderdale reserves the right to reduce or delete any of the bid items.

At time of award of contract, the City reserves the right to set a maximum dollar limit that may be expended on this project. Contract quantities of any or all items may be increased, reduced, or eliminated to adjust the contract amount to coincide with the amount of work necessary or to bring the contract value to within the established limit. All quantities are estimated and the City reserves the right to increase, reduce, or eliminate the contract quantities in any amount.

The undersigned bidder affirms that he has or will obtain all equipment necessary to complete the work described, that he has or will obtain all required permits and licenses from the appropriate agencies, and that his firm is authorized to do business in the State of Florida.

06. BID SECURITY

A certified check, cashier's check, bank officer's check or bid bond for **FIVE** percent **(5%)** of the bid amount, made payable to the City of Fort Lauderdale, Florida, shall accompany each proposal.

SPECIAL CONDITIONS (continued)

PROJECT 11880

07. REQUIRED LICENSES/CERTIFICATIONS

Contractor must possess the following licenses/certifications to be considered for award.

A Broward County Engineering Contractor's license and/or the appropriate license issued by the State of Florida is required for working within public rights-of-way. Contractor must have proper licensing prior to submitting bid and must submit evidence of same with bid.

Note: Contractor must have proper licensing prior to submitting bid and must submit evidence of same with bid

08. SPECIFIC EXPERIENCE REQUIRED

The contractor shall have previous construction experience in sewer collection systems infrastructure, including sewerage lift stations ranging between 40 hp -100 hp, in the State of Florida within the last five (5) years. Bidder shall submit proof of construction of a minimum of three projects; for each project listed, identify location, project name, client's name, address and contact information, pump system capacity and characteristics.

REFERENCES SHOULD NOT INCLUDE CITY OF FORTLAUDERDALE EMPLOYEES.

09. BID ALLOWANCE

Allowance for permits: Payments will be made to the contractor based on the actual cost of permits upon submission of paid permit receipts. The City shall not pay for other costs related to obtaining or securing permits.

The amount indicated is intended to be sufficient to cover the entire project. If the City Permit fees exceed the allowance indicated, the City will reimburse the contractor the actual amount of City Permit Fees required for project completion.

Allowance	\$
Electrical service modifications and utility relocations Allowance	50,000
Permit fee allowance	10,000
Landscape allowance	5,000
Environmental Allowance	50,000
Additional Work	95,000
TOTAL	210,000

Note: The City will add this allowance to your bid.

SPECIAL CONDITIONS (continued)

PROJECT 11880

10. INSURANCE REQUIREMENTS *(See Article 10, Bonds and Insurance, of the Contract for details)*Insurance

10.1 Contractor shall provide and shall require all of its sub-contractors to provide, pay for, and maintain in force at all times during the term of the Agreement, such insurance, including Property Insurance (Builder's Risk), Commercial General Liability Insurance, Business Automobile Liability Insurance, Workers' Compensation Insurance, Employer's Liability Insurance, and Umbrella/Excess Liability, as stated below, as well as Professional Liability insurance in the amount of \$1,000,000 for any Architectural and/or Engineering requirements associated with the fulfillment of the contract if required. Such policy or policies shall be issued by companies authorized to do business in the State of Florida and having agents upon whom service of process may be made in the State of Florida. **A Sample Insurance Certificate shall be included with the proposal to demonstrate the firm's ability to comply with insurance requirements. Provide a previous certificate or other evidence listing the insurance companies' names for all required coverage, and the dollar amounts of the coverage.**

- A. The City is required to be named as additional insured on the Commercial General Liability insurance policy. **BINDERS ARE UNACCEPTABLE.** The insurance coverage required shall include those classifications, as listed in standard liability insurance manuals, which most nearly reflect the operations of the Contractor. Any exclusions or provisions in the insurance maintained by the Contractor that precludes coverage for the work contemplated in this Agreement shall be deemed unacceptable, and shall be considered a breach of contract.
- B. The Contractor shall provide the City an original Certificate of Insurance for policies required by Article 10. All certificates shall state that the City shall be given ten (10) days' notice prior to expiration or cancellation of the policy. The insurance provided shall be endorsed or amended to comply with this notice requirement. In the event that the insurer is unable to accommodate, it shall be the responsibility of the Contractor to provide the proper notice. Such notification will be in writing by registered mail, return receipt requested and addressed to the Finance Department. Such policies shall: (1) name the insurance company or companies affording coverage acceptable to the City, (2) state the effective and expiration dates of the policies, (3) include special endorsements where necessary. Such policies provided under Article 10 shall not be affected by any other policy of insurance, which the City may carry in its own name.

SPECIAL CONDITIONS (continued)

PROJECT 11880

- C. Contractor shall as a condition precedent of this Agreement, furnish to the City of Fort Lauderdale, c/o Project Manager, 100 N. Andrews Avenue, Fort Lauderdale, FL 33301, Certificate(s) of Insurance upon execution of this Agreement, which indicate that insurance coverage has been obtained which meets the requirements as outlined below:

10.2 Property Insurance (Builder's Risk): - N/A

10.3 Commercial General Liability

- A. Limits of Liability:
 Bodily Injury and Property Damage - Combined Single Limit
 Each Occurrence \$1,000,000
 Project Aggregate \$1,000,000
 General Aggregate \$2,000,000
 Personal Injury \$1,000,000
 Products/Completed Operations \$1,000,000
- B. Endorsements Required:
 City of Fort Lauderdale included as an Additional Insured
 Broad Form Contractual Liability
 Waiver of Subrogation
 Premises/Operations
 Products/Completed Operations
 Independent Contractors
 Owners and Contractors Protective Liability
 Contractor's Pollution Liability

10.4 Business Automobile Liability

- A. Limits of Liability:
 Bodily Injury and Property Damage - Combined Single Limit
 All Autos used in completing the contract
 Including Hired, Borrowed or Non-Owned Autos
 Any One Accident \$1,000,000
- B. Endorsements Required:
 Waiver of Subrogation

10.5 Workers' Compensation and Employer's Liability Insurance

Limits: Workers' Compensation – Per Florida Statute 440
 Employers' Liability - \$500,000

Any firm performing work on behalf of the City of Fort Lauderdale must provide Workers' Compensation insurance. Exceptions and exemptions can only be made if they are in accordance with Florida Law. Contractor must be in compliance with all applicable State and Federal workers' compensation laws, including the U.S. Longshore Harbor Workers' Act or Jones Act.

SPECIAL CONDITIONS (continued)

PROJECT 11880

- 10.6 **Umbrella/Excess Liability:** The Contractor shall provide umbrella/excess coverage with limits of no less than \$2,000,000 excess of Commercial General Liability, Automobile Liability and Employer's Liability.
- 10.7 All insurance policies required above shall be issued by companies authorized to do business under the laws of the State of Florida, with the following qualifications:

The Contractor's insurance must be provided by an A.M. Best's "A-" rated or better insurance company authorized to issue insurance policies in the State of Florida, subject to approval by the City's Risk Manager. Any exclusions or provisions in the insurance maintained by the Contractor that precludes coverage for work contemplated in this project shall be deemed unacceptable, and shall be considered breach of contract.

NOTE: CITY PROJECT NUMBER MUST APPEAR ON EACH CERTIFICATE.

A Sample Insurance Certificate shall be included with the proposal to demonstrate the firm's ability to comply with insurance requirements. Provide a previous certificate or other evidence listing the insurance companies' names for all required coverage, and the dollar amounts of the coverage.

Compliance with the foregoing requirements shall not relieve the Contractor of their liability and obligation under this section or under any other section of this Agreement.

The Contractor shall be responsible for assuring that the insurance certificates required in conjunction with this Section remain in force for the duration of the Project. If insurance certificates are scheduled to expire during the contractual period, the Contractor shall be responsible for submitting new or renewed insurance certificates to the City at a minimum of thirty (30) calendar days in advance of such expiration. In the event that expired certificates are not replaced with new or renewed certificates that cover the contractual period, the City shall:

- A. Suspend the Agreement until such time as the new or renewed certificates are received by the City.
- B. The City may, at its sole discretion, terminate the Agreement for cause and seek damages from the Contractor in conjunction with the violation of the terms and conditions of the Agreement.

11. **PERFORMANCE AND PAYMENT BOND:** 100%

Number of awards anticipated: 1

SPECIAL CONDITIONS (continued)

PROJECT 11880

12. CITY PROJECT MANAGER

The Project Manager is hereby designated by the City as Stan Edwards whose address is 100 North Andrews, 4th Floor, Fort Lauderdale, FL 33301, telephone number: (954) 828-5071, and email address is sedwards@fortlauderdale.gov. . The Project Manager will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the Contract Documents in connection with completion of the Work in accordance with this Agreement.

13. LIQUIDATED DAMAGES *(See Article 16, Liquidated Damages, of the Contract for details)*

Upon failure of the Contractor to complete the Work within the time specified for completion, the Contractor shall pay to the City the sum of **Four Hundred Dollars (\$400.00)** for each and every calendar day that the completion of the Work is delayed beyond the time specified in this Agreement for completion, as fixed and agreed liquidated damages and not as a penalty, so long as the delay is caused by the Contractor. (See Article 16, Liquidated Damages Clause, of the Contract)

14. PAYMENT *(See Article 7, Payment, of the Contract for other details)*

The City has implemented a Purchasing Card (P-Card) Program utilizing both VISA and MASTERCARD networks. Purchases from this contract will be made utilizing the City's Purchasing Card. Contractor will receive payment from the purchasing card in the same manner as other credit card purchases. Accordingly, bidders must presently have the ability to accept these credit cards or take whatever steps necessary to implement the ability before the start of the contract term, or contract award by the City. The City reserves the right to revise this program as necessary.

15. WORK SCHEDULING: Regular Hours

City Inspector hours are 8:00 a.m. to 4:30 p.m. Any inspection requested by the contractor outside those hours will be considered overtime to be paid by the Contractor.

16. INSPECTION OVERTIME COST: \$ To be determined

CITY OF FORT LAUDERDALE
CONSTRUCTION AGREEMENT

THIS AGREEMENT made and entered into this _____ day of _____, 20__, by and between the City of Fort Lauderdale, a Florida municipal corporation (City) and _____, (Contractor), (parties);

WHEREAS, the City desires to retain a contractor for the Project as expressed in its Invitation to Bid No., _____, Project Number, _____ which was opened on _____; and,

WHEREAS, the Contractor has expressed its willingness and capability to perform the necessary work to accomplish the Project.

NOW, THEREFORE, the City and the Contractor, in consideration of the mutual covenants and conditions contained herein and for other good and valuable consideration, the receipt and sufficiency is hereby acknowledged, agree as follows:

ARTICLE 1 – DEFINITIONS

Whenever used in this Agreement or in other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural forms:

- 1.1 Agreement – This written Agreement between the City and the Contractor covering the work to be performed including other Contract Documents that are attached to or incorporated in the Agreement.
- 1.2 Application for Payment – The form accepted by the City which is to be used by the Contractor in requesting progress or final payment and which is to include such supporting documentation as is required by the Contract Documents
- 1.3 Approve – The word approve is defined to mean review of the material, equipment or methods for general compliance with design concepts and with the design concepts and with the information given in the Contract Documents. It does not imply a responsibility on the part of the City to verify in every detail conformance with plans and specifications.
- 1.4 Bid – The offer or Bid of the Contractor submitted on the prescribed form setting forth the total prices for the Work to be performed.
- 1.5 Bid Documents – This Agreement, advertisement for Invitation to Bids, the Instructions to Bidders, the Bid Form (with supplemental affidavits and agreements), the Contract Forms, General Conditions, the Supplementary Conditions, the Specifications, and the Plans, which documents all become an integral part of the Contract Documents.
- 1.6 Certificate of Substantial Completion - Certificate provided by the City certifying that all Work, excluding the punch list items, has been completed, inspected, and accepted by the City.

- 1.7 Change Order - A change order is defined as a written order to a contractor approved by the City, authorizing a revision of an underlying agreement between the City and a contractor that is directly related to the original scope of work or an adjustment in the original contract price or the contract time directly related to the original scope of work, issued on or after the effective date of the contract.
- 1.8 City - The City of Fort Lauderdale, Florida, including but not limited to its employees, agents, officials, representatives, contractors, subcontractors, volunteers, successors and assigns, with whom the Contractor has entered into the Agreement and for whom the Work is to be provided.
- 1.9 Contract Documents - The Contract Documents shall consist of this Agreement, Exhibits to this Agreement, Public Construction Bond, Performance Bond, Payment Bond and Certificates of Insurance, Notice of Award and Notice to Proceed, General Conditions as amended by the Special Conditions, Technical Specifications, Plans/Drawings, Addenda, Bid Form and supplement Affidavits and Agreements, all applicable provisions of State and Federal Law and any modification, including Change Orders or written amendments duly delivered after execution of Agreement, Invitation to Bid, Instructions to Bidders and Bid Bond, Contractor's response to the City's Invitation to Bid, Schedule of Completion, Schedule of Values, all amendments, modifications and supplements, change orders and work directive changes issued on or after the Effective Date of the Agreement, as well as any additional documents that are required to be submitted under the Agreement.
- Permits on file with the City and or those permits to be obtained shall be considered directive in nature and will be considered a part of this Agreement. A copy of all permits shall be given to the City for inclusion in the Contract Documents. Terms of permits shall be met prior to acceptance of the Work and release of the final payment.
- 1.10 Contract Price - The monies payable to the Contractor by the City under the Contract Documents and in accordance with the line item unit prices listed in the Bid.
- 1.11 Contract Time - The number of calendar days stated in the Agreement for the completion of the Work. The dates on which the work shall be started and shall be completed as stated in the Notice to Proceed.
- 1.12 Contractor - The person, firm, company, or corporation with whom the City has entered into the Agreement, including but not limited to its employees, agents, representatives, contractors, subcontractors, their subcontractors and their other successors and assigns.
- 1.13 Day - A calendar day of twenty-four (24) hours ending at midnight.
- 1.14 Defective - An adjective which when modifying the word "Work" refers to work that is unsatisfactory, faulty, or deficient, or does not conform to the Contract Documents or does not meet the requirements of any inspection, test or approval referred to in the Contract Documents, or has been damaged prior to the Project Manager's recommendation of final payment.

- 1.15 Effective Date of the Agreement – The effective date of the agreement shall be the date the City Commission approves the work. The contractor shall provide all required payment and performance bonds and insurances to the City within ten (10) Calendar days following the City Commission approval. Upon verification of all bonds and insurances, the City will issue a notice to proceed (NTP) to the Contractor. Contract time will commence on the date when the Notice to Proceed is issued. The Contractor shall commence the work immediately upon receipt of the Notice to Proceed. Failure of the contractor to proceed with the work will constitute non-performance of the Contractor and would be ground for termination of the contract per ARTICLE 17 of the Agreement.
- 1.16 Final Completion Date – The date the Work is completed, including completion of the final punch list, and delivered along with those items specified in the Contract Documents and is accepted by the City.
- 1.17 Hazardous Materials (HAZMAT) - Any solid, liquid, or gaseous material that is toxic, flammable, radioactive, corrosive, chemically reactive, or unstable upon prolonged storage in quantities that could pose a threat to life, property, or the environment defined in Section 101(14) of Comprehensive Environmental Response, Compensation and Liability Act of 1980 and in 40 CFR 300.6. Also defined by 49 CFR 171.8 as a substance or material designated by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce and which has been so designated.
- 1.18 Hazardous Substance - As defined by Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act; any substance designated pursuant to Section 311(b) (2) (A) of the Clean Water Act; any element, compound, mixture, solution or substance designated pursuant to Section 102 identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act {but not including any waste listed under Section 307[a] of the Clean Water Act}; any hazardous air pollutant listed under Section 112 of the Clean Air Act; and any imminently hazardous chemical substance or mixture pursuant to Section 7 of the Toxic Substances Control Act. The term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance in the first sentence of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).
- 1.19 Hazardous Waste - Those solid wastes designated by OSHA in accordance with 40 CFR 261 due to the properties of ignitability, corrosivity, reactivity, or toxicity. Any material that is subject to the Hazardous Waste Manifest requirements of the EPA specified in 40 CFR Part 262.
- 1.20 Holidays - Those designated non-work days as established by the City Commission of the City of Fort Lauderdale.
- 1.21 Inspection – The term “inspection” and the act of inspecting as used in this Agreement is defined to mean the examination of construction to ensure that it conforms to the design concept expressed in the plans and specifications. This term shall not be construed to mean supervision, superintending and/or overseeing.

- 1.22 Notice of Award - The written notice by City to the Contractor stating that upon compliance by the Contractor with the conditions precedent enumerated therein, within the time specified that the City will sign and deliver this Agreement.
- 1.23 Notice to Proceed – A written notice given by the City to the Contractor fixing the date on which the Contract Time will commence to run and on which the Contract Time will end.
- 1.24 Plans - The drawings which show the character and scope of the work to be performed and which have been prepared or approved by the City and are referred to in the Contract Documents.
- 1.25 Premises (otherwise known as Site or Work Site) – means the land, buildings, facilities, etc. upon which the Work is to be performed.
- 1.26 Project – The total construction of the Work to be provided as defined in the Contract Documents.
- 1.27 Project Manager - The employee of the City, or other designated individual who is herein referred to as the Project Manager, will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the contract Documents in connection with completion of the Work in accordance with this Agreement. The Project Manager, or designee, shall be the authorized agent for the City unless otherwise specified.
- 1.28 Punch List - The City's list of Work yet to be done or be corrected by the Contractor, before the Final Completion date can be determined by the City.
- 1.29 Record Documents - A complete set of all specifications, drawings, addenda, modifications, shop drawings, submittals and samples annotated to show all changes made during the construction process.
- 1.30 Record Drawings or "As-Builts" - A set of drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor. These documents will be signed and sealed by the Engineer of Record or a Professional Land Surveyor licensed in the State of Florida.
- 1.31 Substantially Completed Date – A date when the Contractor has requested in writing, stating that the Work is substantially completed and is ready for an inspection and issuance of a final punch list for the Project.
- 1.32 Work – The entire completed delivered product or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating material and equipment into the product, all as required by the Contract Documents.

ARTICLE 2 – SCOPE OF WORK

- 2.1 The Contractor shall complete all work as specified or indicated in the Contract Documents. The Project for which the Work under the Contract Documents may be the whole or only part is generally described as follows:

SANITARY SEWER PUMP STATION D-12 REHABILITATION
ITB 663-11778, PROJECT 11880

- 2.2 All Work for the Project shall be constructed in accordance with the Drawings and Specifications. The Work generally involves:

PROJECT DESCRIPTION

This project is located at 900 Avocado Isle, in the City of Fort Lauderdale. It is primarily for the rehabilitation of an existing wet pit/dry pit pump station. The work includes demolition of all mechanical and electrical equipment, including pumps, pipes, and valves. Replacement with all new equipment, new hatches and grates, concrete repairs, painting and new ventilation equipment.

- 2.3 Within ten (10) days of the execution of this Agreement, the Contractor shall submit a Construction Schedule, Schedule of Values and a listing of those subcontractors that will be utilized by the Contractor. The general sequence of the work shall be submitted by the Contractor and approved by the City before any work commences. The City reserves the right to issue construction directives necessary to facilitate the Work or to minimize any conflict with operations.

ARTICLE 3 – PROJECT MANAGER

- 3.1 The Project Manager is hereby designated by the City as Stan Edwards, whose address is 100 N. Andrews Avenue, 4th Floor, Fort Lauderdale, FL 33301. The Project Manager will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the Contract Documents in connection with completion of the Work in accordance with this Agreement.

ARTICLE 4 – CONTRACT DOCUMENTS

The Contract Documents which comprise the entire Agreement between the City and Contractor are attached to this Agreement, are made a part hereof and consist of the following:

- 4.1 This Agreement.
- 4.2 The Contract Documents may only be altered, amended, or repealed in accordance with the specific provisions of the terms of this Agreement.
- 4.3 Exhibits to this Agreement: (Plans sheets [] to [] inclusive).
- 4.4 Public Construction Bond, Performance Bond, Payment Bond and Certificates of Insurance.

- 4.5 Notice of Award and Notice to Proceed.
- 4.6 General Conditions as amended by the Special Conditions.
- 4.7 Technical Specifications.
- 4.8 Plans/Drawings.
- 4.9 Addenda number _____ through _____, inclusive.
- 4.10 Bid Form and supplement Affidavits and Agreements.
- 4.11 All applicable provisions of State and Federal Law.
- 4.12 Invitation to Bid No., _____, Instructions to Bidders, and Bid Bond.
- 4.13 Contractor's response to the City's Invitation to Bid No., _____, dated _____.
- 4.14 Schedule of Completion and Schedule of Values.
- 4.15 All amendments, modifications and supplements, change orders and work directive changes issued on or after the Effective Date of the Agreement.
- 4.16 Any additional documents that are required to be submitted under the Agreement.
- 4.17 Permits on file with the City and or those permits to be obtained shall be considered directive in nature and will be considered a part of this Agreement. A copy of all permits shall be given to the City for inclusion in the Contract Documents. Terms of permits shall be met prior to acceptance of the Work and release of the final payment.

In the event of any conflict between the documents or any ambiguity or missing specification or instruction, the following priority is established:

- a. Specific direction from the City Manager (or designee).
- b. Approved change orders, addenda or amendments.
- c. Specifications (quality) and Drawings (location and quantity).
- d. Supplemental conditions or special terms.
- e. General Terms and Conditions.
- f. This Agreement dated _____ and any attachments.

- g. Invitation to Bid No., _____, and the specifications prepared by the City.
- h. Contractor's response to the City's Invitation to Bid No., _____, dated _____.
- i. Schedule of Values.
- j. Schedule of Completion.

If during the performance of the Work, Contractor finds a conflict, error or discrepancy in the Contract Documents, Contractor shall so report to the Project Manager, in writing, at once and before proceeding with the Work affected shall obtain a written interpretation or clarification from the City.

It is the intent of the specifications and plans to describe a complete Project to be constructed in accordance with the Contract Documents. Any Work that may reasonably be inferred from the specifications or plans as being required to produce the intended result shall be supplied whether or not it is specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such works shall be interpreted in accordance with such meaning. Reference to standard specifications, manuals or codes of any technical society, organization or associations, or to the code of any governmental authority whether such reference be specific or implied, shall mean the latest standard specification, manual or code in effect as of the Effective Date of this Agreement, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the City, the Contractor, or any of their agents or employees from those set forth in the Contract Documents.

ARTICLE 5 – CONTRACT TIME

- 5.1 The Contractor recognizes that **TIME IS OF THE ESSENCE**. The Work shall commence within 30 calendar days of the date of the Notice to Proceed.
- 5.2 The Work shall be Substantially Completed within 217 calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.
- 5.3 The Work shall be finally completed on the Final Completion Date and ready for final payment in accordance with this Agreement within 279 calendar days after the date when the Contract Time commences to run as provided in the Notice to Proceed.

ARTICLE 6 – CONTRACT PRICE

- 6.1 City shall pay Contractor for performance of the Work in accordance with Article 7, subject to additions and deletions by Change Order, as provided for in this Agreement.
- 6.2 The parties expressly agree that the Contract Price, which shall not exceed the amount of \$ _____ constitutes the total maximum compensation payable to Contractor for performing the Work, plus any Work done pursuant to a Change

Order. The Contract Price is in accordance with the line item unit prices listed in the Bid. Line items are based on a unit price cost multiplied by a defined quantity. Any additional duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change to the Contract Price.

- 6.3 The Contract Price constitutes the compensation payable to Contractor for performing the Work plus any Work done pursuant to a Change Order. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract price.

ARTICLE 7 – PAYMENT

- 7.1 Contractor shall submit Applications for Payment in accordance with the Contract Documents. Applications for Payment will be processed by City as provided in the General Conditions.
- 7.2 Progress Payments. City shall make progress payments on account of the Contract Price on the basis of Contractor's monthly Applications for Payment, which shall be submitted by the Contractor between the first (1st) and the tenth (10th) day after the end of each calendar month for which payment is requested. All progress payments will be made on the basis of the progress of the Work completed.
- 7.3 Prior to Final Completion, progress payments will be made in an amount equal to ninety percent (90%) of the value of Work completed less in each case the aggregate of payments previously made.
- 7.4 Final Payment. Upon final completion of the Work in accordance with the General Conditions, as may be supplemented, the City shall pay Contractor an amount sufficient to increase total payments to one-hundred percent (100%) of the Contract Price. However, not less than ten percent (10%) of the Contract Price shall be retained until Record Drawings (as-builts), specifications, addenda, modifications and shop drawings, including all manufacturers' instructional and parts manuals are delivered to and accepted by the City.
- 7.5 City may withhold, in whole or in part, payment to such extent as may be necessary to protect itself from loss on account of:
- 7.5.1 Defective work not remedied.
 - 7.5.2 Claims filed or reasonable evidence indicating probable filing of claims by other parties against Contractor or City because of Contractor's performance.
 - 7.5.3 Failure of Contractor to make payments properly to Subcontractors or for material or labor.
 - 7.5.4 Damage to another contractor not remedied.
 - 7.5.5 Liquidated damages and costs incurred by Consultant for extended construction administration, if applicable.
 - 7.5.6 Failure of Contractor to provide any and all documents required by the Contract Documents.

When the above grounds are removed or resolved satisfactory to the Project Manager, payment shall be made in whole or in part.

- 7.6 The City shall make payment to the Contractor in accordance with the Florida Prompt Payment Act, Section 218.70, Florida Statutes.
- 7.7 The City shall make payment to the Contractor through utilization of the City's P-Card Program.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

In order to induce the City to enter into this Agreement, Contractor makes the following representations upon which the City has relied:

- 8.1 Contractor is qualified in the field of public construction and in particular to perform the Work and services set forth in this Agreement.
- 8.2 Contractor has visited the Work Site, has conducted extensive tests, examinations and investigations and represents and warrants a thorough familiarization with the nature and extent of the Contract Documents, the Work, locality, soil conditions, moisture conditions and all year-round local weather and climate conditions (past and present), and, in reliance on such tests, examination and investigations conducted by Contractor and the Contractor's experts, has determined that no conditions exist that would in any manner affect the Proposed Price and that the project can be completed for the Proposed Price submitted within the Contract Time as defined in this Agreement. Furthermore, Contractor warrants and confirms that he is totally familiar with, understands and obligates Contractor to comply with all federal, state and local laws, ordinances, rules, regulations and all market conditions that affect or may affect the cost and price of materials and labor needed to fulfill all provisions of this Agreement or that in any manner may affect cost, progress or performance of the Work.
- 8.3 The Contractor has satisfied itself as to the nature and location of the Work under the Contract Documents, the general and local conditions of the Project, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, and roads, the conformation and conditions at the ground based on City provided reports, the type of equipment and facilities needed preliminary to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under the Contract Documents.
- 8.4 The Contractor has also studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Works, and finds and has further determined that no conditions exist that would in any manner affect the Proposed Price and that the project can be completed for the Proposed Price submitted.
- 8.5 Contractor has made or caused to be made examinations, investigations, tests and studies of such reports and related data in addition to those referred to in Paragraphs 8.2, 8.3 and 8.4 above as he deems necessary for the performance of the Work at the Contract Prices, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are, or will be, required by Contractor for such purposes.

8.6 Contractor has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

8.7 Contractor has given City written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution by City is acceptable to the Contractor.

8.8 Labor

8.8.1 The Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. The Contractor shall at all times maintain good discipline and order at the site.

8.8.2 The Contractor shall, at all times, have a competent superintendent, capable of reading and thoroughly understanding the drawings and specifications, as the Contractor's agent on the Work, who shall, as the Contractor's agent, supervise, direct and otherwise conduct the Work.

8.8.3 The Contractor shall designate the superintendent on the job to the City, in writing, immediately after receipt of the Notice to Proceed. The Contractor understands and agrees that the superintendent's physical presence on the job site is indispensable to the successful completion of the Work. If the superintendent is frequently absent from the job site, the Project Manager may deliver written notice to the Contractor to stop work or terminate the Contract in accordance with Article 17.

8.8.4 The Contractor shall assign personnel to the job site that have successfully completed training programs related to trench safety, confined space and maintenance of traffic. A certified "competent person" shall be assigned to the job site. Personnel certified by the International Municipal Signal Associations with Florida Department of Transportation qualifications are required relative to maintenance of traffic. Failure to pursue the Work with the properly certified supervisory staff may result in notice to stop work or terminate the Contract in accordance with Article 17.

8.9 Materials

8.9.1 The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of Work.

8.9.2 All material and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. Suppliers shall be selected and paid by the Contractor; the City reserves the right to approve all suppliers and materials.

8.10 Work Hours: Except in connection with the safety or protection of persons, or the Work, or property at the site or adjacent thereto, and except as otherwise indicated in

the Supplementary Conditions, all work at the site shall be performed during regular working hours between 7 a.m. and 6:00 p.m., Monday through Friday. The Contractor will not permit overtime work or the performance of work on Saturday, Sunday or any legal holiday (designated by the City of Fort Lauderdale) without the Project Manager's written consent at least seventy-two (72) hours in advance of starting such work. If the Project Manager permits overtime work, the Contractor shall pay for the additional charges to the City with respect to such overtime work. Such additional charges shall be a subsidiary obligation of the Contractor and no extra payment shall be made to the Contractor for overtime work. It shall be noted that the City's Inspector work hours are from 8:00 a.m. to 4:30 p.m. and any Work requiring inspection oversight being performed outside of this timeframe shall be paid for by the Contractor as Inspector overtime. The cost to the Contractor to reimburse the City for overtime inspection is established at direct-labor and overtime costs for each person or inspector required. Incidental overtime costs for engineering, testing and other related services will also be charged to the Contractor at the actual rate accrued.

- 8.11 Patent Fee and Royalties: The Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work, or any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. The Contractor hereby expressly binds himself or itself to indemnify and save harmless the City from all such claims and fees and from any and all suits and action of every name and description that may be brought against City on account of any such claims, fees, royalties, or costs for any such invention or patent, and from any and all suits or actions that may be brought against said City for the infringement of any and all patents or patent rights claimed by any person, firm corporation or other entity.
- 8.12 Permits: The Contractor shall obtain and pay for all permits and licenses. There shall be no allowance for Contractor markup, overhead or profit for permits and licenses. The Contractor shall pay all government charges which are applicable at the time of opening of proposals. It shall be the responsibility of the Contractor to secure and pay for all necessary licenses and permits of a temporary nature necessary for the prosecution of Work.
- 8.13 Law and Regulations: The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If the Contractor observes that the specifications or plans are at variance therewith, the Contractor shall give the Project Manager prompt written notice thereof, and any necessary changes shall be adjusted by any appropriate modifications. If the Contractor performs any work knowing or having reason to know that it is contrary to such laws, ordinances, rules and regulations, and without such notice to the Project Manager, the Contractor shall bear all costs arising therefrom; however, it shall not be the Contractor's primary responsibility to make certain that the specifications and plans are in accordance with such laws, ordinances, rules and regulations.
- 8.14 Taxes: The Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by him in accordance with the laws of the City of Fort Lauderdale, County of Broward, State of Florida.
- 8.15 Contractor Use of Premises: The Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workmen to areas permitted

by law, ordinances, permits and/or the requirements of the Contract Documents, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

The Contractor shall not enter upon private property for any purpose without first securing the permission of the property owner in writing and furnishing the Project Manager with a copy of said permission. This requirement will be strictly enforced, particularly with regard to such vacant properties as may be utilized for storage or staging by the Contractor.

The Contractor shall conduct his work in such a manner as to avoid damage to adjacent private or public property. Any damage to existing structures or work of any kind, including permanent reference markers or property corner markers, or the interruption of a utility service, shall be repaired or restored promptly at no expense to the City or property owner.

The Contractor will preserve and protect all existing vegetation such as trees, shrubs and grass on or adjacent to the site which do not reasonably interfere with the construction, as determined by the Project Manager. The Contractor will be responsible for repairing or replacing any trees, shrubs, lawns and landscaping that may be damaged due to careless operation of equipment, stockpiling of materials, tracking of grass by equipment or other construction activity. The Contractor will be liable for, or will be required to replace or restore at no expense to the City all vegetation not protected or preserved as required herein that may be destroyed or damaged.

During the progress of the work, the Contractor shall keep the premises free from accumulations of waste materials, rubbish and debris resulting from the Work. At the completion of the Work, the Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials and shall leave the site clean and ready for occupancy by the City. The Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents at no cost to the City.

- 8.16 Project Coordination: The Contractor shall provide for the complete coordination of the construction effort. This shall include, but not necessarily be limited to, coordination of the following:

8.16.1 Flow of material and equipment from suppliers.

8.16.2 The interrelated work with affected utility companies.

8.16.3 The interrelated work with the City where tie-ins to existing facilities are required.

8.16.4 The effort of independent testing agencies.

8.16.5 Notice to affected property owners as may be directed by the Project Manager.

- 8.17 Project Record Documents and Final As-Builts (Record Drawings): Contractor shall be responsible for maintaining up-to-date redline as-built drawings, on site, at all times during construction. All as-built information shall be surveyed and verified by a professional land surveyor registered in the State of Florida. Contractor shall provide the City with a minimum of three (3) sets of signed and sealed record drawings (Final

CAM 16-1224

EXHIBIT 4

Page 42 of 663

As-Builts) and a CD of the electronic drawings files created in AutoCad 2014 or later. All costs associated with survey work required for construction layout and as-built preparation shall be the responsibility of the Contractor.

8.18 Safety and Protection:

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

- 8.18.1.1 All employees working on the project and other persons who may be affected thereby.
- 8.18.1.2 All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site.
- 8.18.1.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

8.18.2 The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and utilities when execution of the Work may affect them at least seventy-two (72) hours in advance (unless otherwise required). All damage, injury or loss to any property caused, directly or indirectly, in whole or in part by the Contractor, any subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for safety and protection of the Work shall continue until such time as all the Work is completed and accepted by the City.

8.19 Emergencies: In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the City is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Project Manager prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby.

8.20 Risk of Loss: The risk of loss, injury or destruction shall be on the Contractor until acceptance of the Work by the City. Title to the Work shall pass to the City upon acceptance of the Work by the City.

8.21 Environmental: The Contractor has fully inspected the Premises and agrees, except as to the presence of any asbestos, to accept the Premises in an "as is" physical condition, without representation or warranty by the City of any kind, including, without limitation, any and all existing environmental claims or obligations that may arise from the presence of any "contamination" on, in or about the Premises. Further, Contractor and all entities claiming by, through or under the Contractor, releases and discharges

CAM 16-1224

EXHIBIT 4

Page 43 of 663

the City, from any claim, demand, or cause of action arising out of or relating to the Contractor's use, handling, storage, release, discharge, treatment, removal, transport, decontamination, cleanup, disposal and/or presence of any hazardous substances including asbestos on, under, from or about the Premises. The Contractor shall have no liability for any pre-existing claims or "contamination" on the Premises.

The Contractor shall not use, handle, store, discharge, treat, remove, transport, or dispose of Hazardous Substances including asbestos at, in, upon, under, to or from the Premises until receipt of instructions from the City. At such time, a City approved Change Order, which shall not include any profit, shall authorize the Contractor to perform such services.

The Contractor shall immediately deliver to the Project Manager complete copies of all notices, demands, or other communications received by the Contractor from any governmental or quasi-governmental authority or any insurance company or board of fire underwriters or like or similar entities regarding in any way alleged violations or potential violations of any Environmental Law or otherwise asserting the existence or potential existence of any condition or activity on the Premises which is or could be dangerous to life, limb, property, or the environment.

For other and additional consideration, the Contractor hereby agrees, at its sole cost and expense, to indemnify and protect, defend, and hold harmless the City and its respective employees, agents, officials, officers, representatives, contractors and subcontractors, successors, and assigns (hereafter the "City") from and against any and all claims, demands, losses, damages, costs, expenses, including but not limited to mitigation, restoration, and natural restoration expenses, liabilities, assessments, fines, penalties charges, administrative and judicial proceedings and orders, judgments, causes of action, in law or in equity, remedial action requirements and/or enforcement actions of any kind (including, without limitation, attorneys' fees and costs) directly or indirectly arising out of or attributable to, in whole or in part, the Contractor's use, handling, storage, release, threatened release, discharge, treatment, removal, transport, decontamination, cleanup, disposal and/or presence of a Hazardous Substance (excluding asbestos) on, under, from, to or about the Premises or any other activity carried on or undertaken on or off the Premises by the Contractor or its employees, agents or subcontractors, in connection with the use, handling, storage, release, threatened release, discharge, treatment, mitigation, natural resource restoration, removal, transport, decontamination, cleanup, disposal and/or presence or any Hazardous Substance including asbestos located, transported, or present on, under, from, to, or about the Premises. This indemnity is intended to be operable under 42 U.S.C. sections 9607, as amended, and any successor section.

The scope of the indemnity obligations includes, but is not limited to: (a) all consequential damages; (b) the cost of any required or necessary repair, cleanup, or detoxification of the applicable real estate and the preparation and implementation of any closure, remedial or other required plan, including without limitation; (i) the costs of removal or remedial action incurred by the United States government or the State of Florida or response costs incurred by any other person, or damages from injury to destruction of, or loss of, natural resources, including the cost of assessing such injury, destruction, or loss, incurred pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended; (ii) the clean-up costs, fines, damages, or penalties incurred pursuant to any applicable provisions of Florida law;

CAM 16-1224

EXHIBIT 4

Page 44 of 663

and (iii) the cost and expenses of abatement, correction or cleanup, fines, damages, response costs, or penalties which arise from the provisions of any other statute, law, regulation, code ordinance, or legal requirement state or federal; and (c) liability for personal injury or property damage arising under any statutory or common law tort theory, including damages assessed for the maintenance of a public private nuisance, response costs, or for the carrying on of an abnormally dangerous activity.

8.22 No Extended Damages: For other and additional good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Contractor covenants and agrees that in the event of any delay of construction or for any other reason or allegation or claim, and notwithstanding the reason of the delay, reason, claim or allegation or who caused them or the construction delay or whether they were caused by the City, that there will be no entitlement to Contractor to or for any direct or indirect financial damages or losses for extended corporate overhead impact, extended project overhead impacts, project support services, mobilization or demobilization or by whatever other label or legal concept or theory and types of names or labels or basis such claims may have, or any business damages or losses of whatever type or nature, and Contractor hereby waives any right to make any such claim or claims. This provision will have application and effect when construction delays are anticipated and agreed upon by both the City and the Contractor.

8.23 No Liens: If any Subcontractor, supplier, laborer, or materialmen of Contractor or any other person directly or indirectly acting for or through Contractor files or attempts to file a mechanic's or construction lien against the real property on which the work is performed or any part or against any personal property or improvements or claim against any monies due or to become due from the City to Contractor or from Contractor to a Subcontractor, for or on account of any work, labor, services, material, equipment, or other items furnished in connection with the Work or any Change Order, Contractor agrees to satisfy, remove, or discharge such lien or claim at its own expense by bond, payment, or otherwise within twenty (20) days of the filing or from receipt of written notice from the City.

Additionally, until such time as such lien or claim is satisfied, removed or discharged by Contractor, all monies due to Contractor, or that become due to Contractor before the lien or claim is satisfied, removed or otherwise discharged, shall be held by City as security for the satisfaction, removal and discharge of such lien and any expense that may be incurred while obtaining such. If Contractor shall fail to do so, City shall have the right, in addition to all other rights and remedies provided by this Agreement or by law, to satisfy, remove, or discharge such lien or claim by whatever means City chooses at the entire and sole cost and expense of Contractor which costs and expenses shall, without limitation, include attorney's fees, litigation costs, fees and expenses and all court costs and assessments.

8.24 Weather Emergencies: Upon issuance of a Hurricane Watch by the National Weather Service, the Contractor shall submit to the City a plan to secure the work area in the event a Hurricane Warning is issued. The plan shall detail how the Contractor will secure the Premises, equipment and materials in a manner as to prevent damage to the Work and prevent materials and equipment from becoming a hazard to persons and property on and around the Premises. The plan shall include a time schedule required to accomplish the hurricane preparations and a list of emergency contacts that will be available and in the City before, during and immediately after the storm.

Upon issuance of a Hurricane Warning by the National Weather Service, if the Contractor has not already done so, the Contractor shall implement its hurricane preparedness plan. Cost of development and implementation of the hurricane preparedness plan shall be considered as incidental to construction. Cost of any clean up and rework required after the storm will be considered normal construction risk within Florida and shall not entitle the Contractor to any additional compensation. Contractor shall be entitled to request an extension in time for completion of the Work, in accordance with the provisions of Article 15 of this Agreement, equal to the time he is shut down for implementation of the preparedness plan, the duration of the storm and a reasonable period to restore the Premises.

- 8.25 Force Majeure: No Party shall hold the other responsible for damages or for delays in performance caused by force majeure, acts of God, or other acts or circumstances beyond the control of the other party or that could not have been reasonably foreseen and prevented. For this purposes, such acts or circumstances shall include, but not be limited to weather conditions affecting performance, floods, epidemics, war, riots, strikes, lockouts, or other industrial disturbances, or protest demonstrations. Should such acts or circumstances occur, the parties shall use their best efforts to overcome the difficulties arising therefrom and to resume the Work as soon as reasonably possible with the normal pursuit of the Work.

Inclement weather, continuous rain for less than three (3) days or the acts or omissions of subcontractors, third-party contractors, materialmen, suppliers, or their subcontractors, shall not be considered acts of force majeure.

No Party shall be liable for its failure to carry out its obligations under the Agreement during a period when such Party is rendered unable by force majeure to carry out its obligation, but the obligation of the Party or Parties relying on such force majeure shall be suspended only during the continuance of the inability and for no longer period than the unexpected or uncontrollable event.

The Contractor further agrees and stipulates, that its right to excuse its failure to perform by reason of force majeure shall be conditioned upon giving written notice of its assertion that a Force Majeure delay has commenced within 96 hours after such an occurrence. The CONTRACTOR shall use its reasonable efforts to minimize such delays. The CONTRACTOR shall promptly provide an estimate of the anticipated additional time required to complete the Project.

- 8.26 Participation By Disadvantaged Business Enterprises in Department of Transportation Financial Assisted Contracts: The recipient shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any DOT-assisted contract or in the administration of its DBE program or the requirements of 49 CFR part 26. The recipient shall take all necessary and reasonable steps under 49 CFR part 26 to ensure nondiscrimination in the award and administration of DOT-assisted contracts. The recipient's DBE program, as required by 49 CFR part 26 and as approved by DOT, is incorporated by reference in this agreement. Implementation of this program is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the recipient of its failure to carry out its approved program, the Department may impose sanctions as provided for under part 26 and may, in appropriate cases, refer the matter for enforcement under 18

U.S.C. 1001 and/or the Program Fraud Civil Remedies Act of 1986 (31 U.S.C. 3801 *et seq.*).

Additionally, the contractor assures that they, the sub recipient or the subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate. (This additional language must be included in each subcontract the prime contractor signs with a subcontractor.)

ARTICLE 9 – CITY’S RESPONSIBILITIES

- 9.1 The City shall furnish the data required of the City under the Contract Documents promptly and shall make payments to the Contractor promptly after they are due as provided in Article 7.
- 9.2 The City’s duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in the Contract Documents.
- 9.3 Technical Clarifications and Interpretations:
- 9.3.1 The City shall issue, with reasonable promptness, such written clarifications or interpretations of the Contract Documents as it may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. Should the Contractor fail to request interpretation of questionable items in the Contract Documents, the City shall not entertain any excuse for failure to execute the Work in a satisfactory manner.
- 9.3.2 The City shall interpret and decide matters concerning performance under the requirements of the Contract Documents, and shall make decisions on all claims, disputes or other matters in question. Written notice of each claim, dispute or other matter will be delivered by claimant to the other Party but in no event later than five (5) days after the occurrence of event, and written supporting data will be submitted to the other Party within five (5) days after such occurrence. All written decisions of the City on any claim or dispute will be final and binding.
- 9.4 The Contractor shall perform all Work to the reasonable satisfaction of the City in accordance with the Contract Documents. In cases of disagreement or ambiguity, the City shall decide all questions, difficulties, and disputes of whatever nature, which may arise under or by reason of this Agreement or the quality, amount and value of the Work, and the City’s decisions on all claims, questions and determination are final.

ARTICLE 10 – BONDS AND INSURANCE

10.1 Public Construction and Other Bonds: The Contractor shall furnish Public Construction or Performance and Payment Bonds ("Bond"), each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all the Contractor's obligations under the Contract Documents. These Bonds shall remain in effect until at least one (1) year after the date of final payment, except as otherwise provided by law. All Bonds shall be furnished and provided by the surety and shall be in substantially the same form as prescribed by the Contract Documents and be executed by such sureties as (i) are licensed to conduct business in the State of Florida, and (ii) are named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department and (iii) otherwise meet the requirements set forth herein that apply to sureties. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act.

10.1.1 Performance Bond: A Corporate Surety Bond legally issued, meeting the approval of, and running to the City in an amount not less than the Contract Price of such improvements, conditioned that the Contractor shall maintain and make all repairs to the improvements constructed by the Contractor at their own expense and free of charge to the City, for the period of one (1) year after the date of acceptance of the Work within such period by reason of any imperfection of the material used or by reason of any defective workmanship, or any improper, imperfect or defective preparation of the base upon which any such improvement shall be laid.

The Contractor shall execute and record in the public records of Broward County, Florida, a payment and performance bond in an amount at least equal to the Contract Price with a surety insurer authorized to do business in the State of Florida as surety, ("Bond"), in accordance with Section 255.05, Florida Statutes (2014), as may be amended or revised, as security for the faithful performance and payment of all of the Contractor's obligations under the Contract Documents.

10.2 Disqualification of Surety: If the Surety on any Bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Florida or it ceases to meet the requirements of clauses (i) and (ii) of Paragraph 10.1, the Contractor shall within five (5) days thereafter substitute another Bond and Surety, both of which shall be acceptable to the City.

10.3 Insurance

10.3.1 Contractor shall provide and shall require all of its sub-contractors to provide, pay for, and maintain in force at all times during the term of the Agreement, such insurance, including Property Insurance (Builder's Risk), Commercial General Liability Insurance, Business Automobile Liability Insurance, Workers' Compensation Insurance, Employer's Liability Insurance, and Umbrella/Excess Liability, as stated below, as well as Professional Liability insurance in the amount of \$1,000,000 for any Architectural and or Engineering requirements associated with the

CAM 16-1224

EXHIBIT 4

Page 48 of 663

fulfillment of the contract if required. Such policy or policies shall be issued by companies authorized to do business in the State of Florida and having agents upon whom service of process may be made in the State of Florida. **A Sample Insurance Certificate shall be included with the proposal to demonstrate the firm's ability to comply with insurance requirements. Provide a previous certificate or other evidence listing the insurance companies' names for all required coverage, and the dollar amounts of the coverage.**

- A. The City is required to be named as additional insured on the Commercial General Liability insurance policy. BINDERS ARE UNACCEPTABLE. The insurance coverage required shall include those classifications, as listed in standard liability insurance manuals, which most nearly reflect the operations of the Contractor. Any exclusions or provisions in the insurance maintained by the Contractor that precludes coverage for the work contemplated in this Agreement shall be deemed unacceptable, and shall be considered a breach of contract.
- B. The Contractor shall provide the City an original Certificate of Insurance for policies required by Article 10. All certificates shall state that the City shall be given ten (10) days' notice prior to expiration or cancellation of the policy. The insurance provided shall be endorsed or amended to comply with this notice requirement. In the event that the insurer is unable to accommodate, it shall be the responsibility of the Contractor to provide the proper notice. Such notification will be in writing by registered mail, return receipt requested and addressed to the Finance Department. Such policies shall: (1) name the insurance company or companies affording coverage acceptable to the City, (2) state the effective and expiration dates of the policies, (3) include special endorsements where necessary. Such policies provided under Article 10 shall not be affected by any other policy of insurance, which the City may carry in its own name.
- C. Contractor shall as a condition precedent of this Agreement, furnish to the City of Fort Lauderdale, c/o Project Manager, 100 N. Andrews Avenue, Fort Lauderdale, FL 33301, Certificate(s) of Insurance upon execution of this Agreement, which indicate that insurance coverage has been obtained which meets the requirements as outlined below:

10.3.2 Property Insurance (Builder's Risk): - N/A

10.3.3 Commercial General Liability

- A. Limits of Liability:
- | | |
|---|-------------|
| Bodily Injury and Property Damage - Combined Single Limit | |
| Each Occurrence | \$1,000,000 |
| Project Aggregate | \$1,000,000 |
| General Aggregate | \$2,000,000 |
| Personal Injury | \$1,000,000 |
| Products/Completed Operations | \$1,000,000 |
- B. Endorsements Required:
- City of Fort Lauderdale included as an Additional Insured
 - Broad Form Contractual Liability
 - Waiver of Subrogation
 - Premises/Operations
 - Products/Completed Operations
 - Independent Contractors
 - Owners and Contractors Protective Liability
 - Contractors Pollution Liability

10.3.4 Business Automobile Liability

- A. Limits of Liability:
- | | |
|---|-------------|
| Bodily Injury and Property Damage - Combined Single Limit | |
| All Autos used in completing the contract | |
| Including Hired, Borrowed or Non-Owned Autos | |
| Any One Accident | \$1,000,000 |
- B. Endorsements Required:
- Waiver of Subrogation

10.3.5 Workers' Compensation and Employer's Liability Insurance

Limits: Workers' Compensation – Per Florida Statute 440
Employers' Liability - \$500,000

Any firm performing work on behalf of the City of Fort Lauderdale must provide Workers' Compensation insurance. Exceptions and exemptions can only be made if they are in accordance with Florida Law.

Contractor must be in compliance with all applicable State and Federal workers' compensation laws, including the U.S. Longshore Harbor Workers' Act or Jones Act.

- 10.3.6 Umbrella/Excess Liability: The Contractor shall provide umbrella/excess coverage with limits of no less than \$2,000,000 excess of Commercial General Liability, Automobile Liability and Employer's Liability.

- 10.3.7 All insurance policies required above shall be issued by companies authorized to do business under the laws of the State of Florida, with the following qualifications:

The Contractor's insurance must be provided by an A.M. Best's "A-" rated or better insurance company authorized to issue insurance policies in the State of Florida, subject to approval by the City's Risk Manager. Any exclusions or provisions in the insurance maintained by the Contractor that precludes coverage for work contemplated in this project shall be deemed unacceptable, and shall be considered breach of contract.

NOTE: CITY PROJECT NUMBER MUST APPEAR ON EACH CERTIFICATE.

A Sample Insurance Certificate shall be included with the proposal to demonstrate the firm's ability to comply with insurance requirements. Provide a previous certificate or other evidence listing the insurance companies' names for all required coverage, and the dollar amounts of the coverage.

Compliance with the foregoing requirements shall not relieve the Contractor of their liability and obligation under this section or under any other section of this Agreement.

The Contractor shall be responsible for assuring that the insurance certificates required in conjunction with this Section remain in force for the duration of the Project. If insurance certificates are scheduled to expire during the contractual period, the Contractor shall be responsible for submitting new or renewed insurance certificates to the City at a minimum of thirty (30) calendar days in advance of such expiration. In the event that expired certificates are not replaced with new or renewed certificates that cover the contractual period, the City shall:

- A. Suspend the Agreement until such time as the new or renewed certificates are received by the City.
- B. The City may, at its sole discretion, terminate the Agreement for cause and seek damages from the Contractor in conjunction with the violation of the terms and conditions of the Agreement.

ARTICLE 11- WARRANTY AND GUARANTEE, TESTS AND INSPECTIONS, CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

- 11.1 Warranty: The Contractor warrants and guarantees to the City that all Work will be in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to the Contractor. All defective work, whether or not in place, may be rejected, corrected or accepted as provided in this Article.

- 11.1.1 Warranty of Title: The Contractor warrants to the City that it possesses good, clear and marketable title to all equipment and materials provided and that there are no pending liens, claims or encumbrances against the equipment and materials.

11.1.2 Warranty of Specifications: The Contractor warrants that all equipment, materials and workmanship furnished, whether furnished by the Contractor, its subcontractors or suppliers, will comply with the specifications, drawings and other descriptions supplied or adopted and that all services will be performed in a workmanlike manner.

11.1.3 Warranty of Merchantability: The Contractor warrants that any and all equipment to be supplied pursuant to this Agreement is merchantable, free from defects, whether patent or latent in material or workmanship, and fit for the ordinary purposes for which it is intended.

11.2 Tests and Inspections: Contractor shall retain the services of an independent, certified, testing lab to perform all testing as required by the specifications, Contract drawings, and any applicable permitting agency. Contractor shall provide evidence of certification to the City before the work and testing is done. Testing results shall be submitted to the Engineer for review and approval at the time the results are provided to the Contractor. The Contractor shall give the Project Manager and City Inspector a minimum of twenty-four (24) hours' advanced notice of readiness of the Work for all required inspections, tests, or approvals and shall notify all applicable permitting agencies in a timely manner based on requirements set forth in the permit documents.

11.2.1 Neither observations by the Project Manager nor inspections, tests or approvals by others shall relieve the Contractor from its obligations to perform the Work in accordance with the Contract Documents.

11.3 Uncovering Work: If any work that is to be inspected, tested or approved is covered without approval or consent of the Project Manager, it must, if requested by the Project Manager, be uncovered for observation and/or testing. Such uncovering and replacement shall be at the Contractor's sole expense unless the Contractor has given the Project Manager timely notice of the Contractor's intention to cover such Work and the Project Manager has not acted with reasonable promptness in response to such notice.

11.3.1 If the Project Manager considers it necessary or advisable that Work covered in accordance with Paragraph 11.2.1, 11.2.2 and 11.2.3 be observed by the City or inspected or tested by others, the Contractor at the City's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the Project Manager may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, the Contractor shall bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order shall be issued. If, however, such work is not found to be defective, the Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection testing and reconstruction if he makes a claim therefore as provided in Articles 14 and 15.

11.4 City May Stop the Work: If the Work is defective, or the Contractor fails to supply sufficient skilled supervisory personnel or workmen or suitable materials or equipment or the work area is deemed unsafe, the City may order the Contractor to stop the

Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the City to stop the Work shall not give rise to any duty on the part of the City to exercise this right for the benefit of the Contractor or any other party. The City will not award any increase in Contract Price or Contract Time if the Work is stopped due to the circumstances described herein.

- 11.5 Correction or Removal of Defective Work Before Final Payment: If required by the Project Manager, the Contractor shall promptly, without cost to the City and as Specified by the Project Manager, either correct any defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by the City remove it from the site and replace it with non-defective Work.
- 11.6 One Year Correction Period After Final Payment: If within one (1) year after the date of final acceptance, or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective, the Contractor shall promptly, without cost to the City and in accordance with the City's written instructions, either correct such defective Work, or, if it has been rejected by the City, remove it from the site and replace it with non-defective Work.

If The Contractor does not promptly comply with the terms of such instructions or in an emergency where delay would cause serious risk of loss or damage, the City may have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs for such removal and replacement, including compensation for additional professional services, shall be paid by the Contractor.

- 11.7 Acceptance of Defective Work, Deductions: If, instead of requiring correction or removal and replacement of defective Work, the City, at the city's sole option, prefers to accept it, the City may do so. In such a case, if acceptance occurs prior to the Project Manager's recommendation of final payments, a Change Order shall be issued incorporating the necessary revisions in the Contracts Documents, including appropriate reduction in the Contract Price; or if the acceptance occurs after such recommendation, an appropriate amount shall be paid by the Contractor to the City.
- 11.8 City May Correct Defective Work: If the Contractor fails within a reasonable time after written notice of the Project Manager to proceed to correct defective Work or to remove and replace rejected Work as required by the Project Manager in accordance with Paragraph 11.5, or if the Contractor fails to perform the Work in accordance with the Contract Documents, the City may, after seven (7) days written notice to the Contractor, correct and remedy any such deficiency. In exercising its rights under this paragraph, the City shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, the City may exclude the Contractor from all or part of the site, take possession of all or part of the Work, suspend the Contractor's services related thereto and take possession of the Contractor's tools, construction equipment and materials stored at the site or elsewhere. The Contractor shall allow the City's representative agents and employees such access to the site as may be necessary to enable the City to exercise its rights under this paragraph. All direct and indirect costs of the City in exercising such rights shall be charged against the Contractor in an amount verified by the Project Manager, and a Change Order shall be issued incorporating the necessary revisions in the Contract Documents and a reduction in the Contract Price. Such direct and indirect costs shall include, in particular but

without limitation, compensation for additional professional services required and costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of the Contractor's defective Work. The Contractor shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by the City of the City's right hereunder.

ARTICLE 12 – INDEMNIFICATION

12.1 Disclaimer of Liability: The City shall not at any time, be liable for injury or damage occurring to any person or property from any cause, whatsoever, arising out of Contractor's construction and fulfillment of this agreement.

12.2 Indemnification: For other, additional good valuable consideration, the receipt and sufficiency of which is hereby acknowledged:

12.2.1 Contractor shall, at its sole cost and expense, indemnify and hold harmless the City, its representatives, employees and elected and appointed officials from or on account of all claims, damages, losses, liabilities and expenses, direct, indirect or consequential including but not limited to fees and charges of engineers, architects, attorneys, consultants and other professionals and court costs arising out of or in consequence of the performance of this Agreement at all trial and appellate levels. Indemnification shall specifically include but not be limited to claims, damages, losses, liabilities and expenses arising out of or from (a) the negligent or defective design of the project and Work of this Agreement; (b) any act, omission or default of the Contractor, its Subcontractors, agents, servants or employees; (c) any and all bodily injuries, sickness, disease or death; (d) injury to or destruction of tangible property, including any resulting loss of use; (e) other such damages, liabilities, or losses received or sustained by any person or persons during or on account of any operations connected with the construction of this Project including the warranty period; (f) the use of any improper materials; (g) any construction defect including both patent and latent defects; (h) failure to timely complete the work; (i) the violation of any federal, state, county or city laws, ordinances or regulations by Contractor, its subcontractors, agents, servants, independent contractors or employees; (j) the breach or alleged breach by Contractor of any term of the Agreement, including the breach or alleged breach of any warranty or guarantee.

12.2.2 Contractor agrees to indemnify, defend, save and hold harmless the City, its officers, agents and employees, from all damages, liabilities, losses, claims, fines and fees, and from any and all suits and actions of every name and description that may be brought against City, its officers, agents and employees, on account of any claims, fees, royalties, or costs for any invention or patent and/or for the infringement of any and all copyrights or patent rights claimed by any person, firm, or corporation.

12.2.3 Contractor shall pay all claims, losses, liens, settlements or judgments of any nature in connection with the foregoing indemnifications including, but not limited to, reasonable attorney's fees and costs for trials and appeals.

12.2.4 If any Subcontractor, supplier, laborer, or materialmen of Contractor or any other person directly or indirectly acting for or through Contractor files or attempts to file a mechanic's or construction lien against the real property on which the work is performed or any part or against any personal property or improvements thereon or make a claim against any monies due or to become due from the City to Contractor or from Contractor to a Subcontractor, for or on account of any work, labor, services, material, equipment, or other items furnished in connection with the Work or any change order, Contractor agrees to satisfy, remove, or discharge such lien or claim at its own expense by bond, payment, or otherwise within five (5) days of the filing or from receipt of written notice from the City.

Additionally, until such time as such lien or claim is satisfied, removed or discharged by Contractor, all monies due to Contractor, or that become due to Contractor before the lien or claim is satisfied, removed or otherwise discharged, shall be held by City as security for the satisfaction, removal and discharge of such lien and any expense that may be incurred while obtaining the discharge. If Contractor shall fail to do so, City shall have the right, in addition to all other rights and remedies provided by this Agreement or by law, to satisfy, remove, or discharge such lien or claim by whatever means City chooses at the entire and sole cost and expense of Contractor which costs and expenses shall, without limitation, include attorney's fees, litigation costs, fees and expenses and all court costs and assessments, and which shall be deducted from any amount owing to Contractor. In the event the amount due Contractor is less than the amount required to satisfy Contractor's obligation under this, or any other article, paragraph or section of this Agreement, the Contractor shall be liable for the deficiency due the City.

12.2.5 The Contractor and the City agree that Section 725.06(2), Florida Statutes controls the extent and limits of the indemnification and hold harmless provisions of this Agreement, if any, and that the parties waive any defects in the wording of this Article that runs afoul of said statutory section.

ARTICLE 13 – CHANGES IN THE WORK

- 13.1 Without invalidating this Agreement, the City may, at any time or from time to time order additions, deletions or revisions in the Work through the issuance of Change Orders. Upon receipt of a Change Order, the Contractor shall proceed with the Work involved. All Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made as provided in Article 14 or Article 15 on the basis of a claim made by either Party.
- 13.2 The Project Manager may authorize minor changes in the work not involving an adjustment in the Contract Price or the Contract Time, which are consistent with the overall intent of the Contract Documents. Such changes must be in writing and signed by the City and the Contractor.
- 13.3 If notice of any change affecting the general scope of the Work or change in the Contract Price is required by the provisions of any Bond to be given to the Surety, it

CAM 16-1224

EXHIBIT 4

Page 55 of 663

will be the Contractor's responsibility to so notify the Surety, and the amount of each applicable Bond shall be adjusted accordingly. The Contractor shall furnish proof of such adjustment to the City.

ARTICLE 14 – CHANGE OF CONTRACT PRICE

Change of Contract Price, approved by CITY, shall be computed as follows:

14.1 Cost of the Work: The term "Cost of the Work" means the sum of all direct costs necessarily incurred and paid by Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by the City, these costs shall be in amounts no higher than those prevailing in the City and shall include only the following items and shall not include any of the costs itemized in Paragraph 14.3:

14.1.1 Payroll costs for employees in the direct employ of the Contractor in the performance of the Work under schedules of job classifications agreed upon by the City and the Contractor. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus and cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, worker's compensation, health and retirement benefits, bonuses, sick leave, vacation and applicable holiday pay.

14.1.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage, and required suppliers and field services. All cash discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to the City, and the Contractor shall make provisions so that they may be obtained.

14.1.3 Supplemental costs including the following:

14.1.3.1 Cost, including transportation and maintenance of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work.

14.1.3.2 Rentals of all construction equipment and machinery and the parts whether rented from the Contractor or others in accordance with rental agreements approved by the City, and the costs of transporting, loading, unloading, installation, dismantling and removal. The rental of any such equipment, machinery or parts shall cease when the use is no longer necessary for the Work.

14.1.3.3 Sales, consumer, use or similar taxes related to the Work and for which the Contractor is liable, imposed by laws and regulations.

14.1.3.4 Royalty payments and fees for permits and licenses.

14.1.3.5 The cost of utilities, fuel and sanitary facilities at the Work site.

- 14.1.3.6 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.
- 14.1.3.7 Cost of premiums for additional bonds and insurance required because of changes in the Work.

14.2 The Contract Price may only be increased by a Change Order when Work is modified in accordance with Article 13 and approved by the City in writing. Any claim for an increase in the Contract Price resulting from a Change Order shall be based on written notice delivered to the Project Manager within ten (10) days of the occurrence of the Change Order giving rise to the claim. Notice of the amount of the claim with supporting data shall be included in the Change Order and delivered within twenty (20) days of such occurrence unless Project Manager allows an additional period of time to ascertain accurate cost data. Any change in the Contract Price resulting from any such claim shall be incorporated in the Change Order. **IT IS EXPRESSLY AND SPECIFICALLY AGREED THAT ANY AND ALL CLAIMS FOR CHANGES TO THE CONTRACT PRICE SHALL BE WAIVED IF NOT SUBMITTED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION.**

14.3 Not Included in the Cost of the Work: The term "cost of the Work" shall not include any of the following:

- 14.3.1 Payroll costs and other compensation of the Contractor's officers executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditor, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by the Contractor whether at the site or in the Contractor's principal or branch office for general administration of the work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 14.1.1, all of which are to be considered administrative costs covered by the Contractor's fee.
- 14.3.2 Expenses of the Contractor's principal and branch offices other than the Contractor's office at the site.
- 14.3.3 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work and charges against the Contractor for delinquent payments.
- 14.3.4 Cost of premiums for all bonds and for all insurance whether or not the Contractor is required by the Contract Documents to purchase and maintain the same.
- 14.3.5 Costs due to the negligence of the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

14.3.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 14.1

14.4 Basis of Compensation: The Contractor's compensation, allowed to the Contractor for overhead and profit, shall be determined as follows:

14.4.1 A mutually acceptable negotiated fee:

14.4.1.1 For costs incurred under Paragraphs 14.1.1 and 14.1.2, the Contractor's fee shall not exceed five percent (5%).

14.4.1.2 No fee shall be payable on the basis of costs itemized under Paragraphs 14.1.3.1, 14.1.3.2, 14.1.3.3, 14.1.3.4, 14.1.3.5, 14.1.3.6, 14.1.3.7, 14.3.1, 14.3.2, 14.3.3, 14.3.4, 14.3.5 and 14.3.6.

14.4.1.3 The amount of credit to be allowed by the Contractor to the City for any such change which results in a net decrease plus a deduction in the Contractor's fee by an amount equal to five percent (5%) for the net decrease.

14.4.1.4 When both additions and credits are involved in any one change the combined overhead and profit shall be figured on the basis of net increase if any, however, not to exceed five percent (5%) of the agreed compensation. Profit will not be paid on any Work not performed.

14.5 Cost Breakdown Required: Whenever the cost of any Work is to be determined pursuant to this Article, the Contractor will submit in form acceptable to the City an itemized cost breakdown together with supporting documentation. Whenever a change in the Work is to be based upon mutual acceptance of a lump sum, whether the amount is an addition, credit, or no-charge-in-cost, the Contractor shall submit an estimate substantiated by a complete itemized breakdown:

14.5.1 The breakdown shall list quantities and unit prices for materials, labor, equipment and other items of cost.

14.5.2 Whenever a change involves the Contractor and one (1) or more subcontractors and the change is an increase in the agreed compensation, the overhead and profit percentage for the Contractor and each subcontractor shall be itemized separately.

14.6 Time for the City to Approve Extra Work: Any Extra Work in an amount up to and not exceeding a cumulative amount of \$25,000 for a specific project can be approved by the City Manager and shall require a written Change Order proposal to be submitted to the Public Works Director for submittal and approval by the City Manager. Extra Work exceeding the cumulative amount of \$25,000 for a specific project must be approved by the City Commission and a written Change Order proposal must be submitted to the Public Works Director for submittal and approval by the City Manager and City Commission. No financial or time claim for delay to the project resulting from the Change Order approval process outlined above under Section 14.6 will be allowed.

ARTICLE 15 – CHANGE OF THE CONTRACT TIME

- 15.1 The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to the Project Manager within five (5) days of the occurrence of the event giving rise to the claim. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.
- 15.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of the Contractor if a claim is made there for as provided in Paragraph 15.1. Such delays shall include but not be limited to, acts or neglect by the City, or to fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God.
- 15.3 All time limits stated in the Contract Documents are of the essence. The provisions of this Article 15 shall not exclude recovery for damages for delay by the Contractor.
- 15.4 Delays caused by or resulting from entities, contractors or subcontractors who are not affiliated with the CONTRACTOR (non-affiliated Contractors) shall not give rise to a claim by the CONTRACTOR for damages for increases in material and/or labor costs. Such entities, contractors and subcontractors include, but are not limited to, the City's contractors and subcontractors, Florida Power and Light Company, AT&T and Florida East Coast Railway, LLC.
- 15.5 Rights of Various Interests: Whenever work being done by City's forces or by other contractors is contiguous to or within the limits of work covered by this Contract, the respective rights of the various interests involved shall be established by the Project Manager to secure the completion of the various portions of the work in general harmony.

ARTICLE 16 – LIQUIDATED DAMAGES

- 16.1 Upon failure of the Contractor to complete the Work within the time specified for completion, the Contractor shall pay to the City the sum of **Four Hundred Dollars (\$400.00)** for each and every calendar day that the completion of the Work is delayed beyond the time specified in this Agreement for completion, as fixed and agreed liquidated damages and not as a penalty, so long as the delay is caused by the Contractor. Should an act of God or the acts or omissions of the City, its agents or representatives, in derogation to the terms of this Agreement cause the delay, the Contractor shall not be responsible for the delay nor liquidated damages. Liquidated damages are fixed and agreed upon between the Parties, recognizing the impossibility of precisely ascertaining the amount of damages that will be sustained by the City as a consequence of such delay and both parties desiring to obviate any question of dispute concerning the amount of damages and the cost and effect of the failure of the Contractor to complete the Work on time. Liquidated damages shall apply separately to each portion of the Work for which a time of completion is given. The City shall have the right to deduct from or retain any compensation which may be due or which may become due and payable to the Contractor the amount of liquidated damages, and if the amount retained by the City is insufficient to pay in full such liquidated damages, the Contractor shall pay all liquidated damages in full. The Contractor shall be responsible for reimbursing the City, in addition to liquidated damages or other

damages for delay, for all costs of engineering, architectural fees, and inspection and other costs incurred in administering the construction of the Project beyond the completion date specified or beyond an approved extension of time granted to the Contractor whichever is later. Delays caused by or resulting from entities, contractors or subcontractors who are not affiliated with the Contractor shall not give rise to a claim by Contractor for damages for increase in material and/or labor costs. Such entities, contractors and subcontractors include, but are not limited to, the City's contractors and subcontractors, Florida Power and Light Company, AT&T, and Florida East Coast Railway, LLC.

- 16.2 No Extended Damages: For other and additional good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Contractor covenants and agrees that in the event of any delay of construction or for any reason, allegation or claim, and notwithstanding the reason of the delay, reason, claim or allegation or who caused them or the construction delay or whether they were caused by the City, that there will be no entitlement to Contractor to or for any direct or indirect financial damages or losses for extended corporate overhead impact, extended project overhead impacts, project support services, mobilization or demobilization or by whatever other label or legal concept or theory and types of names or labels or basis such claims may have, or any business damages or losses of whatever type or nature, and Contractor hereby waives any right to make any such claim or claims. This provision will have application and effect when construction delays are anticipated and agreed upon by both the City and the Contractor.

ARTICLE 17 – SUSPENSION OF WORK AND TERMINATION

- 17.1 City May Suspend Work: The City may, at any time and without cause, suspend the Work or any portion of the Work for a period of not more than ninety (90) days by notice in writing to the Contractor which shall fix the date on which Work shall be resumed. The Contractor shall resume the Work on the date fixed. The Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension, if the Contractor makes a claim as provided in Articles 14 and 15.

- 17.2 City's Right to Terminate Contract: The City may terminate this Agreement upon fifteen (15) calendar days' written notice upon the occurrence of any one or more of the following events:

17.2.1 If the Contractor commences a voluntary case or a petition is filed against the Contractor, under any chapter of the Bankruptcy Code, or if the Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency.

17.2.2 If the Contractor makes a general assignment for the benefit of creditors.

17.2.3 If a trustee, receiver, custodian or agent of the Contractor is appointed under applicable law or under Contract, whose appointment or authority to take charge of property of the Contractor is for the purpose of enforcing a lien against such property or for the purpose of general administration of such property for the benefit of the Contractor's creditors.

17.2.4 If Contractor fails to begin the Work within fifteen (15) calendar days after the Project Initiation Date, or fails to perform the Work with sufficient workers and equipment or with sufficient materials to ensure the prompt completion of the Work, or shall perform the Work unsuitably, or cause it to be rejected as defective and unsuitable, or shall discontinue the prosecution of the Work pursuant to the accepted schedule or if Contractor shall fail to perform any material term set forth in the Contract Documents, or from any other cause whatsoever shall not carry on the Work in an acceptable manner, Project Manager may give notice in writing to Contractor and its Surety of such delay, neglect or default, specifying the same.

17.2.5 If the Contractor repeatedly fails to make prompt payments to subcontractors or for labor, material or equipment.

17.2.6 If the Contractor repeatedly disregards proper safety procedures.

17.2.7 If the Contractor disregards any local, state or federal laws or regulations.

17.2.8 If the Contractor otherwise violates any provisions of this Agreement.

17.3 If Contractor, within a period of ten (10) calendar days after such notice, shall not proceed in accordance therewith, the City may exclude the Contractor from the Work site and take the prosecution of the Work out of the hands of the Contractor, and take possession of the Work and all of the Contractor's tools, appliances, construction equipment and machinery at the site and use them without liability to the City for trespass or conversion, incorporate in the Work all materials and equipment stored at the site or for which the City has paid the Contractor but which are stored elsewhere, and finish the Work as the City may deem expedient. In this instance, the Contractor shall not be entitled to receive any further compensation until the Work is finished.

17.3.1 If after notice of termination of Contractor's right to proceed, it is determined for any reason that Contractor was not in default, the rights and obligations of City and Contractor shall be the same as if the notice of termination had been issued pursuant to the Termination for Convenience clause as set forth in Section 17.5 below.

17.3.2 Upon receipt of Notice of Termination pursuant to Sections 17.2 or 17.5, Contractor shall promptly discontinue all affected work unless the Notice of Termination directs otherwise and deliver or otherwise make available to City all data, drawings, specifications, reports, estimates, summaries and such other information as may have been required by the Contract Documents whether completed or in process.

17.4 If the Contractor commits a default due to its insolvency or bankruptcy, the following shall apply:

17.4.1 Should this Agreement be entered into and fully executed by the parties, funds released and the Contractor (Debtor) files for bankruptcy, the following shall occur:

17.4.1.1 In the event the Contactor files a voluntary petition under 11 U.S.C. 301 or 302, or an order for relief is entered under 11 U.S.C. 303, the Contractor shall acknowledge the extent, validity, and priority of the lien recorded in favor of the City. The Contractor further agrees that in the event of this default, the City shall, at its option, be entitled to seek relief from the automatic stay pursuant to 11 U.S.C. 362. The City shall be entitled to relief from the automatic stay pursuant to 11 U.S.C. 362(d) (1) or (d) (2), and the Contactor agrees to waive the notice provisions in effect pursuant to 11 U.S.C. 362 and any applicable Local Rules of the United States Bankruptcy Court. The Contactor acknowledges that such waiver is done knowingly and voluntarily.

17.4.1.2 Alternatively, in the event the City does not seek stay relief, or if stay relief is denied, the City shall be entitled to monthly adequate protection payments within the meaning of 11 U.S.C. 361. The monthly adequate protection payments shall each be in an amount determined in accordance with the Note and Mortgage executed by the Contractor in favor of the City.

17.4.1.3 In the event the Contractor files for bankruptcy under Chapter 13 of Title 11, United States Code in addition to the foregoing provisions, the Contractor agrees to cure any amounts in arrears over a period not to exceed twenty-four (24) months from the date of the confirmation order, and such payments shall be made in addition to the regular monthly payments required by the Note and mortgage. Additionally, the Contractor shall agree that the City is over secured and, therefore, entitled to interest and attorney's fees pursuant to 11 U.S.C. 506(b). Such fees shall be allowed and payable as an administrative expense. Further, in the event the Contractor has less than five (5) years of payments remaining on the Note, the Contractor agrees that the treatment afforded to the claim of the City under any confirmed plan of reorganization shall provide that the remaining payments shall be satisfied in accordance with the Note, and that the remaining payments or claim shall not be extended or amortized over a longer period than the time remaining under the Note.

17.4.2 Should this Agreement be entered into and fully executed by the parties, and the funds have not been forwarded to Contractor, the following shall occur:

17.4.2.1 In the event the Contractor files a voluntary petition pursuant to 11 U.S.C. 301 or 302, or an order for relief is entered under 11 U.S.C. 303., the Contractor acknowledges that the commencement of a bankruptcy proceeding constitutes an event of default under the terms of this Agreement. Further, the Contractor acknowledges that this Agreement constitutes an executory contract within the meaning of 11 U.S.C. 365. The Contractor acknowledges that this Agreement is not capable of being assumed pursuant to 11 U.S.C. 365(c)(2), unless the City expressly consents in writing to the assumption. In the event the City consents to the assumption, the Contractor agrees to file a motion to assume this Agreement within ten (10) days after receipt of written consent from the City, regardless of whether the bankruptcy

proceeding is pending under Chapter 7, 11, or 13 of Title 11 of the United States Code. The Contractor further acknowledges that this Agreement is not capable of being assigned pursuant to 11 U.S.C. 365(b)(1).

- 17.5 Termination for Convenience: This Contract may be terminated for convenience in writing by City upon thirty (30) days written notice to Contractor (delivered by certified mail, return receipt requested) of intent to terminate and the date on which such termination becomes effective. In such case, Contractor shall be paid for all work executed and expenses incurred prior to termination in addition to termination settlement costs reasonably incurred by Contractor relating to commitments which had become firm prior to the termination. Payment shall include reasonable profit for work/services satisfactorily performed. No payment shall be made for profit for work/services which have not been performed.
- 17.6 Where the Contractor's service have been so terminated by the City, the termination shall not affect any rights of the City against the Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due the Contractor by the City will not release the Contractor from liability.
- 17.7 The Contractor has no right, authority or ability to terminate the Work except for the wrongful withholding of any payments due the Contractor from the City.

ARTICLE 18 – DISPUTE RESOLUTION

- 18.1 Resolution of Disputes: Questions, claims, difficulties and disputes of whatever nature which may arise relative to the technical interpretation of the Contract Documents and fulfillment of this Agreement as to the character, quality, amount and value of any work done and materials furnished, or proposed to be done or furnished under or, by reason of, the Contract Documents which cannot be resolved by mutual agreement of Contract Administrator and Contractor shall be submitted to the Consultant for resolution. When either party has determined that a disputed question, claim, difficulty or dispute is at an impasse, that party shall notify the other party in writing and submit the question, claim, difficulty or dispute to the Consultant for resolution. The parties may agree to a proposed resolution at any time without the involvement and determination of the Consultant.
- 18.1.1 Consultant shall notify Contract Administrator and Contractor in writing of Consultant's decision within twenty-one (21) calendar days from the date of the submission of the question, claim, difficulty or dispute, unless Consultant requires time to gather information or allow the parties to provide additional information.
- 18.1.2 In the event the determination of a dispute by the Consultant under this Article is unacceptable to any of the parties hereto, the party objecting to the determination must notify the other party and the City Manager, in writing within ten (10) days after receipt of the determination. The notice must state the basis of the objection and the proposed resolution. Final resolution of such dispute shall be made by the City Manager. The City Manager's decision shall be final and binding on the parties.

- 18.1.3 All non-technical administrative disputes (such as billing and payment) shall be determined by Contract Administrator.
- 18.1.4 During the pendency of any dispute and after a determination thereof, Contractor, Consultant, and Contract Administrator shall act in good faith to mitigate any potential damages including utilization of construction schedule changes and alternate means of construction. During the pendency of any dispute arising under this Agreement, other than termination herein, Contractor shall carry on the Work and adhere to the progress schedule. The Work shall not be delayed or postponed pending resolution of any disputes or disagreements.
- 18.1.5 For any disputes which remain unsolved, within sixty (60) calendar days after Final Completion of the Work, the parties shall participate in mediation to address all unresolved disputes. A mediator shall be mutually agreed upon by the parties. Should any objection not be resolved in mediation, the parties retain all their legal rights and remedies under applicable law. If a party objecting to a determination, fails to comply in strict accordance with the requirements of this Article, said party specifically waives all of its rights provided hereunder, including its rights and remedies under applicable law.

ARTICLE 19 – NOTICES

- 19.1 All notices required by any of the Contract Documents shall be in writing and shall be deemed delivered upon mailing by certified mail, return receipt requested to the following:

To the City:

City Manager
City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301

with copy to the:

Project Manager and City Attorney
City of Fort Lauderdale
100 North Andrews Avenue
Fort Lauderdale, Florida 33301

To the Contractor:

ARTICLE 20 – LIMITATION OF LIABILITY

- 20.1 The City desires to enter into this Agreement only if in so doing the City can place a limit on the City's liability for any cause of action arising out of this Agreement, so that the City's liability for any breach never exceeds the sum of \$1,000. For other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Contractor expresses its willingness to enter into this Agreement with the knowledge that the Contractor's recovery from the City to any action or claim arising from the Agreement is limited to a maximum amount of \$1,000, which amount shall be reduced by the amount actually paid by the City to the Contractor pursuant to this Agreement, for any action or claim arising out of this Agreement. Nothing contained in this paragraph or elsewhere in this Agreement is in any way intended either to be a waiver of the limitation placed upon the City's liability as set forth in Section 768.28, Florida Statutes, or to extend the City's liability beyond the limits established in said Section 768.28; and no claim or award against the City shall include attorney's fees, investigative costs, expert fees, suit costs or pre-judgment interest.
- 20.2 No Extended Damages: For other and additional good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Contractor covenants and agrees that in the event of any delay of construction or for any reason, allegation or claim, and notwithstanding the reason of the delay, reason, claim or allegation or who caused them or the construction delay or whether they were caused by the City, that there will be no entitlement to Contractor to or for any direct or indirect financial damages or losses for extended corporate overhead impact, extended project overhead impacts, project support services, mobilization or demobilization or by whatever other label or legal concept or theory and types of names or labels or basis such claims may have, or any business damages or losses of whatever type or nature, and Contractor hereby waives any right to make any such claim or claims. This provision will have application and effect when construction delays are anticipated and agreed upon by both the City and the Contractor.

ARTICLE 21 – GOVERNING LAW

- 21.1 This Agreement shall be governed by the laws of the State of Florida. Both Parties agree that the courts of the State of Florida shall have jurisdiction of any claim arising in connection with this Agreement. Venue for any claim, objection or dispute arising out of this Agreement shall be in Broward County, Florida. **By entering into this Contract, Contractor and City hereby expressly waive any rights either party may have to a trial by jury or any civil litigation related to, or arising out of the Project. Contractor shall specifically bind all subcontractors to the provisions of this Contract.**

ARTICLE 22 – MISCELLANEOUS

- 22.1 The duties and obligations imposed by this Agreement and the rights and remedies available to the parties and, in particular but without limitation, the warranties, guaranties and obligations imposed upon the Contractor and all of the rights and remedies available to the City, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by laws or regulations, by special warranty or

guarantee or by other provisions of the Contract Documents, and the provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents, and the provisions of this Paragraph will survive final payment and termination or completion of this Agreement.

- 22.2 The Contractor shall not assign or transfer this Agreement or its rights, title or interests. The obligations undertaken by the Contractor pursuant to this Agreement shall not be delegated or assigned to any other person or firm. Violation of the terms of this Paragraph shall constitute a material breach of Agreement by the Contractor and the City any, at its discretion, cancel this Agreement and all rights, title and interest of the Contractor which shall immediately cease and terminate.
- 22.3 The Contractor and its employees, volunteers and agents shall be and remain an independent contractors and not agents or employees of the City with respect to all of the acts and services performed by and under the terms of this Agreement. This Agreement shall not in any way be constructed to create a partnership, association or any other kind of joint undertaking or venture between the Parties.
- 22.4 The City reserves the right to audit the records of the Contractor relating in any way to the Work to be performed pursuant to this Agreement at any time during the performance and term of this Agreement and for a period of three (3) years after completion and acceptance by the City. If required by the City, the Contractor agrees to submit to an audit by an independent certified public accountant selected by the City. The Contractor shall allow the City to inspect, examine and review the records of the Contractor at any and all times during normal business hours during the term of this Agreement.
- 22.5 The remedies expressly provided in this Agreement to the City shall not be deemed to be exclusive but shall be cumulative and in addition to all other remedies in favor of the City now or later existing at law or in equity.
- 22.6 Should any part, term or provisions of this Agreement be decided by the courts to be invalid, illegal or in conflict with any state or federal law, the validity of the remaining portion or provision shall not be affected.
- 22.7 Public Entity Crimes: In accordance with the Public Crimes Act, Section 287.133, Florida Statutes, a person or affiliate who is a contractor, consultant or other provider, 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 the City, may not submit a bid on a contract with the City for the construction or repair of a public building or public work, may not submit bids on leases of real property to the City, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with the City, and may not transact any business with the City in excess of the threshold amount provided in Section 287.017, Florida Statutes, for category two purchases for a period of thirty-six (36) months from the date of being placed on the convicted vendor list. Violation of this section by Contractor shall result in cancellation of the City purchase and may result in Contractor debarment.

Sanitary Sewer Pump Station A-12 Rehabilitation
(Contractor)
Project 11880

CITY

IN WITNESS OF THE FOREGOING, the parties have set their hands and seals the day and year first above written.

CITY OF FORT LAUDERDALE, a municipal
corporation of the State of Florida

By: _____
LEE R. FELDMAN, City Manager

(CORPORATE SEAL)

ATTEST:

By: _____
JEFFREY A. MODARELLI
City Clerk

Approved as to Legal Form:

By: _____
RHONDA MONTOYA HASAN
Assistant City Attorney

CONTRACTOR

WITNESSES:

CONTRACTOR.,
a Florida corporation.

By _____

Print Name_____
PRINT NAME_____
Title

ATTEST:

BY: _____

Print Name_____
PRINT NAME_____
Secretary

(CORPORATE SEAL)

STATE OF FLORIDA:
COUNTY OF BROWARD:

The foregoing instrument was acknowledged before me this ____ day of _____, 2016, by _____ (Name), _____ as (Title) of _____ (CONTRACTOR), a Florida corporation, on behalf of the Corporation.

SEAL

Notary Public, State of Florida_____
Name of Notary Typed, Printed or Stamped☐ Personally Known or ☐ Produced Identification:

Type of Identification Produced: _____

GENERAL CONDITIONS

Unless otherwise modified in the projects special conditions, the following General Conditions shall be part of the Contract:

GC - 01 - DEFINITIONS - The following words and expressions, or pronouns used in their stead, shall wherever they appear in the Contract and the Contract Documents, be construed as follows:

"Addendum" or "Addenda" - shall mean the additional Contract provisions issued in writing, by the Engineer, prior to the receipt of bids.

"Bid" – shall mean the offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

"Bidder" – shall mean any person, firm, company, corporation or entity submitting a Bid for the Work.

"Bonds" –shall mean Bid, performance and payment bonds and other instruments of security, furnished by Contractor and his surety in accordance with the Contract Documents.

"City" – shall mean the City of Fort Lauderdale, Florida, a Florida municipal corporation. In the event the City exercises its regulatory authority as a government body, the exercise of such regulatory authority and the enforcement of any rules, regulations, codes, laws and ordinances shall be deemed to have occurred pursuant to City's authority as a governmental body and shall not be attributable in any manner to the City as a party to this Contract. For the purpose of this Contract, "City" without modification shall mean the City Commission, and/or City Manager or his/her designee(s) as applicable.

"Construction Manager" - shall mean the Public Works Director or his/her designee.

"Construction Project Manager" - shall mean the Public Works Director or his/her designee.

"Consultant" – shall mean a person, firm, company, corporation or other entity employed by the City to perform the professional services for the project.

"Contract Work" - shall mean everything expressed or implied to be required to be furnished and furnished by the Contractor by any one or more of the parts of the Contract Documents referred to in the Contract 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 Public Works Director shall determine which shall prevail.

"Design Documents" – shall mean the construction plans and specifications included as part of a Bid/Proposal Solicitation prepared either by the City or by the Consultant under a separate Agreement with the City.

"Engineer" - shall mean the Public Works Director or his/her designee.

"Extra Work" - shall mean work other than that required by the Contract.

"Inspector" – shall mean an authorized representative of the City assigned to make necessary inspections of materials furnished by Contractor and of the Work performed by Contractor.

"Notice" - shall mean written notice sent by certified United States Mail, return receipt requested, or sent by commercial express carrier with acknowledgement of delivery, or via fax or email, or by hand delivery with a request for a written receipt of acknowledgment of delivery and shall be served upon the Contractor either personally or to its place of business listed in the Bid.

"Owner" - shall mean the City of Fort Lauderdale.

"Project Manager" - shall mean the Public Works Director or his/her designee.

"Public Works Director" -shall mean the Public Works Director of the City of Fort Lauderdale, Florida or his/her designee(s).

"Site" - shall mean the area upon or in which the Contractor's operations are carried out and such other areas adjacent thereto as may be designated as such by the Public Works Director.

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

"Surety" - shall mean any corporation or entity that executes, as Surety, the Contractor's performance and payment bond securing the performance of this Contract.

GC - 02 - SITE INVESTIGATION AND REPRESENTATION - The Contractor acknowledges that it has satisfied itself as to the nature and location of the Work under the Contract Documents, the general and local conditions of the Site, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, and roads, the conformation and conditions at the ground based on City provided reports, the type of equipment and facilities needed preliminary to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under the Contract Documents.

The Contractor acknowledges that it has conducted extensive tests, examinations and investigations and represents and warrants a thorough familiarization with the nature and extent of the Contract Documents, the Work, locality, soil conditions, moisture conditions and all year-round local weather and climate conditions (past and present), and, in reliance on such tests, examination and investigations conducted by Contractor and the Contractor's experts, has determined that no conditions exist that would in any manner affect the Bid Price and that the project can be completed for the Bid Price submitted.

The Contractor, on its own, has made or caused to be made examinations, investigations, tests and studies of reports and related data in addition to those referred above, as Contractor deemed necessary to perform the Work at the Bid price set by the Contractor, within the contract time and in accordance with the other terms and conditions of the Contract Documents and the Bid made by the Contractor; and no additional examinations, investigations, tests, reports or similar data are, or will be, required by Contractor to assure that the Work can be done at the Bid price set by the Contractor.

The Contractor further acknowledges that it has satisfied itself based on any geotechnical reports the City may provide and inspection of the project Site as to the character, quality, and quantity of surface and subsurface materials to be encountered from inspecting the site and from evaluating information derived from exploratory work that may have been done by the City or included in the Contract Documents and finds and has further determined that no conditions exist that would in any manner affect the Bid price and that the project can be completed for the Bid price submitted.

Any failure by the Contractor to acquaint itself with all the provided information and information obtained by visiting the project Site will not relieve Contractor from responsibility for properly estimating the difficulty or cost thereof under the Contract Documents. In the event that the actual subsurface conditions vary from the actual City provided reports, the Contractor shall notify the City and the Contract amount may be adjusted depending on the conditions, at the approval of the City.

GC - 03 - SUBSTITUTIONS - If the Contractor desires to use materials and/or products of manufacturer's names different from those specified in the Contract Documents, the Bidder requesting the substitution shall make written application as described herein. The burden of proving the equality of the proposed substitution rests on the Bidder making the request. To be acceptable, the proposed substitution shall meet or exceed all expressed requirements of the Contract Documents and shall be submitted upon the Contractor's letterhead, in addition to the "Contractor's Request for Substitution" form provided by the Public Works Director. The following requirements shall be met in order for the substitution to be considered:

1. Requests for substitution shall reach the Public Works Director no less than ten (10) Working Days prior to the date set for opening of Bids; and
2. Requests for substitution shall be accompanied by such technical data, as the party making the request desires to submit. The Public Works Director will consider reports from reputable independent testing laboratories, verified experience records from previous users and other written information valid in the circumstances; and
3. Requests for substitution shall completely and clearly indicate in what respects the materials and/or products differ from those indicated in the Contract Documents; and
4. Requests for substitution shall be accompanied by the manufacturer's printed recommendations clearly describing the installation, use and care, as applicable, of the proposed substitutions; and
5. Requests for substitution shall be accompanied by a complete schedule of changes in the Contract Documents, if any, which must be made to permit the use of the proposed substitution; and
6. Provide the "Contractor's Request for Substitution" form, completely executed. Failure to provide all pertinent data will result in immediate rejection of such a request.

If a proposed substitution is approved by the Public Works Director, an Addendum will be issued to prospective bidders not less than three (3) working days prior to the date set for opening of Bids. Unless substitutions are received and approved as described above, the successful Bidder shall be responsible for furnishing materials and products in strict accordance with the Contract Documents.

GC - 04 - CONTROL OF THE WORK - The Public Works Director shall have full control and direction of the Work in all respects. The Public Works Director and/or his authorized designee(s) shall, at all times, have the right to inspect the Work and materials. The Contractor shall furnish all reasonable facilities for obtaining such information, as the Public Works Director may desire respecting the quality of the Work and materials and the manner of conducting the Work. Should the Contractor be directed or permitted to perform night Work, or to vary the period which work is ordinarily carried on in the daytime, he shall give ample notice to the Public Works Director so that proper and adequate inspection may be provided. Such Work shall be done only under such regulations as are furnished in writing by the Public Works Director, and no extra compensation shall be allowed to the Contractor therefore. In the event of night work, the Contractor shall furnish

such light, satisfactory to the Public Works Director, as will insure proper inspection. Nothing herein contained shall relieve the Contractor from compliance with any and all City ordinances relating to noise or Work during prohibited hours.

The Contractor shall keep the Public Works Director informed, a reasonable time in advance, as to his need for grades and lines in order that the same may be furnished and all necessary measurements made for records and for payment with the minimum of inconvenience to the Public Works Director or of delay to the Contractor. The Contractor shall submit to the Public Works Director or Inspector on the job a written request outlining the streets, etc., for which the Contractor desires lines and grades. It is the intention not to delay the Work for the giving of lines and grades, but when necessary, work operations shall be suspended for such reasonable time as the Public Works Director may require for this purpose. However, such cost increases shall be authorized either by the City Manager and/or designee, or the City Commission based upon the purchasing threshold amounts provided for in Chapter 2 of the City of Fort Lauderdale's Code of Ordinances.

GC - 05 - SUBCONTRACTOR - The Contractor shall not sublet, in whole or any part of the Work without the written consent and approval of the Public Works Director. Within ten (10) days after official notification of starting date, the Contractor must submit in writing, to the Public Works Director, a list of all Subcontractors. No Work shall be done by any Subcontractor until such Subcontractor has been officially approved by the Public Works Director. A subcontractor not appearing on the original list will not be approved without written request submitted to the Public Works Director and approved by the Public Works Director. In all cases, the Contractor shall give his personal attention to the Work of the Subcontractors and the Subcontractor is liable to be discharged by the Contractor, at the direction of the Public Works Director, for neglect of duty, incompetence or misconduct.

Acceptance of any Subcontractor, other person, or organization by the Public Works Director shall not constitute a waiver of any right of Public Works Director to reject defective Work or Work not in conformance with the Contract Documents.

Contractor shall be fully responsible for all acts and omissions of his Subcontractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between City and any Subcontractor or other person or organization having a direct contract with Contractor, nor shall it create any obligation on the part of City to pay or to see to the payment of any moneys due to any Subcontractor or other person, or organization, except as may otherwise be required by law.

GC – 06 - QUANTITIES - It is mutually agreed that the proposal shows the approximate amounts only along with the Plans and the general location. It is also mutually agreed that no change will be made involving any departure from the general scheme of the Work and that no such change involving a material change in cost, either to the City or Contractor, shall be made, except upon written permission of the City. However, the Public Works Director shall have the right to make minor alternations in the line, grade, plan, form or materials of the Work herein contemplated any time before the completion of the same. That if such alterations shall diminish the quantity of the Work to be done, such alterations shall not constitute a claim for damages or anticipated profits. That if such alterations increase the amount of the Work to be done, such increase shall be paid for according to the quantity actually performed and at the unit price or prices stipulated therefore in the Contract.

The City shall, in all cases of dispute, determine the amount or quantity of the several kinds of Work which are to be paid for under this Contract, and shall decide all questions relative to the execution of the same, and such estimates and decisions shall be final and binding.

Any Work not herein specified, which might be fairly implied as included in the Contract, of which the City shall judge, shall be done by the Contractor without extra charge. However, such cost increases shall be authorized either by the City Manager and/or designee, or the City Commission based upon the purchasing threshold amounts provided for in Chapter 2 of the City of Fort Lauderdale's Code of Ordinances.

GC-07 - NO ORAL CHANGES - Except to the extent expressly set forth in the Contract, no change in or modification, termination or discharge of the Contract in any form whatsoever, shall be valid or enforceable unless it is in writing and signed by the parties charged, therewith or their duly authorized representative.

GC - 08 - PERMITS AND PROTECTION OF PUBLIC – Permits on file with the City and or those permits to be obtained shall be considered directive in nature and will be considered a part of this Contract. A copy of all permits shall be given to the City and become part of the Contract Documents. Terms of permits shall be met prior to acceptance of the Work and release of the final payment.

The Contractor shall be required to observe all the ordinances in relation to obtaining permits for occupying, excavating, or in any way obstructing the streets and alleys. He shall erect and maintain barricades and sufficient safeguards around all excavations, embankments or obstructions; he shall place sufficient warning lights at or near the Work; keep the same burning from sunset to sunrise, employ watchmen, and strictly obey all laws and ordinances controlling or limiting those engaged in similar work.

Where there are telephones, light or power poles, water mains, conduits, pipes or drains or other construction, either public or private, in or on the streets or alleys, the Work shall be so conducted that no interruption or delay will be caused in the operation or use of the same. Proper written notice shall be given, and all the facilities, afforded the owners of such construction encountered or likely to be encountered, as will enable them to preserve the same from injury.

The Contractor shall not be permitted to interfere with public travel and convenience by grading or tearing up streets indiscriminately, but the Work of constructing the various items in this contract shall proceed in an orderly, systematic and progressive manner.

Contractor shall not load nor permit any part of any structure to be loaded with weights that will endanger the structure, nor shall he subject any part of the Work to stresses or pressures that will endanger it.

Where lifting operations involving the use of specialized cranes are required as part of construction, Contractor must make undertake the following investigation and submit the results and documentation to the Engineer prior to commencing any lifting operations: marking a very specific area in the field for the placement of the crane; a drawing showing the limitations of the job operation (i.e. not over adjacent properties or pedestrian and high vehicular traffic areas); underground utility exploration in the vicinity of the crane location, which may include ground penetrating radar to identify voids or old pipe or other subsurface features that could lead to sudden failure; assessment of the underlying soil and roadway materials and a worst case analysis based on entire load being distributed on just one or two outriggers; provision of properly sized pads under the outriggers; loading charts from manufacturer showing allowable configurations/loads; and inspection to make sure crane operation is in accordance with the permit conditions.

GC - 09 - DISEASE REGULATIONS - The Contractor shall enforce all sanitary regulations and take all precautions against infectious diseases as the Public Works Director may deem necessary. Should any infectious or contagious diseases occur among his employees, he shall arrange for the immediate removal of the employee from the Site and isolation of all persons connected with the Work.

GC - 10 - CONTRACTOR TO CHECK PLANS, SPECIFICATIONS, AND DATA - The Contractor shall verify all dimensions, quantities, and details shown on the plans, supplementary drawings, schedules, or other data received from the Public Works Director, and shall notify the Public Works Director of all errors, omissions, conflicts and discrepancies found therein within three (3) working days of discovery. 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 there from nor from rectifying such condition at his own expense.

GC - 11 - SUPPLEMENTARY DRAWINGS - When, in the opinion of the Public Works Director, 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 Public Works Director and copies will be given to the Contractor.

The supplementary drawings shall be binding upon the Contractor with the same force as the original Plans. Where such supplementary drawings require either less or more than the estimated quantities of work, credit to the City or compensations therefore to the Contractor shall be subject to the terms of the Contract.

GC - 12 - MATERIALS AND WORKMANSHIP - All material and workmanship shall, in every respect, be in conformity with approved modern practice and with prevailing standards of performance and quality. In the event of dispute the Public Works Director's decision shall be final. Wherever the Plans, specifications, Contract Documents, or the directions of the Public Works Director are unclear as to what is permissible and/or fail to note the quality of any Work, that interpretation will be made by the Public Works Director, which is in accordance with approved modern practice, to meet the particular requirements of the Contract.

In all cases, new materials shall be used, unless this provision is waived by notice from the City in writing.

GC - 13 - 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 re-establishing same if disturbed, or bear the entire expense of rectifying Work improperly installed due to not maintaining or protecting or for removing without authorization, such established points, stakes and marks. The Contractor shall safeguard all existing and known property corners, monuments and marks not related to the Work and, if required, shall bear the cost of having them re-established by a licensed surveyor if disturbed or destroyed during the course of construction.

GC - 14 - EXISTING UTILITY SERVICE - All existing utility service shall be maintained with a minimum of interruption at the expense of the Contractor.

GC - 15 - JOB DESCRIPTION SIGNS - Contractor, at Contractor's expense, shall furnish, erect, and maintain suitable weatherproof signs on jobs over \$100,000 containing the following information:

1. City Seal (in colors)
2. Project or Improvement Number
3. Job Description
4. Estimated Cost
5. Completion Date

Minimum size of sign shall be four feet high, eight feet wide and shall be suitably anchored. The entire sign shall be painted and present a pleasing appearance. Exact location of signs will be determined in the field. Two (2) signs will be required, one at each end of the job. All costs of this work shall be included in other parts of the work.

GC - 16 - FLORIDA EAST COAST RIGHT-OF-WAY - Whenever a City contractor is constructing within the Florida East Coast Railway Company's Right-of-Way, it will be mandatory that the contractor carry separate bodily injury and property damage insurance in the amounts as stated below. This insurance shall be taken out and maintained during the life of the Contract.

Bodily injury insurance in an amount not less than \$500,000.00 for injuries, including wrongful death to any one person, and subject to the same limit for each person, in an amount not less than \$1,000,000.00 on account of any one occurrence, and

Property damage insurance in an amount not less than \$500,000.00 for damages on account of any one occurrence and in an amount not less than \$1,000,000.00 for damages on account of all occurrences.

GC - 17 - ACCIDENTS - The Contractor shall provide such equipment and facilities as are necessary and/or required, in the case of accidents, for first aid services to be provided to a person who may be injured during the project duration. The Contractor shall also comply with the OSHA requirements as defined in the United States Labor Code 29 CFR 1926.50.

In addition, the Contractor must report immediately to the Public Works Director every accident to persons or damage to property, and shall furnish in writing full information, including testimony of witnesses regarding any and all accidents.

GC - 18 - SAFETY PRECAUTIONS - Contractor must adhere to the applicable environmental protection guidelines for the duration of a project. If hazardous waste materials are used, detected or generated at any time, the Project Manager must be immediately notified of each and every occurrence. The Contractor shall comply with all codes, ordinances, rules, orders and other legal requirements of public authorities (including OSHA, EPA, DERM, the City, Broward County, State of Florida, and Florida Building Code), which bear on the performance of the Work.

The Contractor shall take the responsibility to ensure that all Work is performed using adequate safeguards, including but not limited to: proper safe rigging, safety nets, fencing, scaffolding, barricades, chain link fencing, railings, barricades, steel plates, safety lights, and ladders that are necessary for the protection of its employees, as well as the public and City employees. All riggings and scaffolding shall be constructed with good sound materials, of adequate dimensions for their intended use, and substantially braced, tied or secured to ensure absolute safety for those required to use it, as well as those in the vicinity. All riggings, scaffolding, platforms, equipment guards, trenching, shoring, ladders and similar actions or equipment shall be OSHA approved, as applicable, and in accordance with all Federal, State and local regulations.

GC - 19 - DUST PREVENTION - The Contractor shall, by means of a water spray, or temporary asphalt pavement, take all necessary precautions to prevent or abate a dust nuisance arising from dry weather or Work in an incomplete stage. All costs of this Work shall be included in cost of other parts of the Work.

Should the Contractor fail to abate a dust nuisance by the above methods, and then he will be required to immediately construct temporary patches per City standards.

GC - 20 - PLACING BARRICADES AND WARNING LIGHTS - The Contractor shall furnish and place, at his own expense, all barricades, warning lights, automatic blinker lights and such devices necessary to properly protect the work and vehicular and pedestrian traffic. Should the Contractor fail to erect or maintain such barricades, warning lights, etc., the Public Works Director may, after 24 hours' notice to the Contractor, proceed to have such barricades and warning lights placed and maintained by City or other forces and all costs incurred thereof charged to the Contractor and may be retained by the City from any monies due, or to become due, to the Contractor.

GC - 21 - TRAFFIC CONTROL - The Contractor shall coordinate all Work and obtain, through the Engineering Department, any permits required to detour traffic or close any street before starting to work in the road. The following section: Part VI Traffic Controls for Street and Highway Construction and Maintenance Operations, MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, U.S. Department of Transportation Federal Highway Administration, 2009, or current edition, shall be used as a guide for requirement and placement of traffic control devices, signs and barricades. The Public Works Director shall determine requirements for the above. The above publication is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. In the event that a Maintenance of Traffic (MOT) Plan is required, the Plan shall be prepared by an A.A.S.T.A. certified technician.

All traffic control devices, flashing lights, signs and barricades shall be maintained in working condition at all times.

GC - 22 - COORDINATION - The Contractor shall notify all utilities, transportation department, etc., in writing, with a copy to the Public Works Director before construction is started and shall coordinate his Work with them. The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal, construction and rearrangement operations in order that services rendered by these parties will not be unnecessarily interrupted.

The Contractor shall arrange his Work and dispose of his materials so as to not interfere with the operation of other Contractors engaged upon adjacent work and to join his Work to that of others in a proper manner and to perform his Work in the proper sequence in relation to that of other Contractors all as may be directed by the Public Works Director.

Each Contractor shall be responsible for any damage done by him or his agents to the work performed by another Contractor.

The Contractor shall contact the Broward County Transportation Department and the Florida Department of Transportation, as applicable, to verify and obtain location of any and all traffic conduits, loops, and street light underground services.

GC - 23 - WATER - Bulk water used for construction, flushing pipelines, and testing shall be obtained from fire hydrants. Contractor shall make payment for hydrant meter at Treasury Billing

Office, 1st Floor, City Hall, 100 N. Andrews Avenue. With the paid receipt, contractor can pick up hydrant meter at the utility location office. No connection shall be made to a fire hydrant without a meter connected.

GC - 24 - PROHIBITION AGAINST CONTRACTING WITH SCRUTINIZED COMPANIES - Subject to *Odebrecht Construction, Inc., v. Prasad*, 876 F.Supp.2d 1305 (S.D. Fla. 2012), *affirmed*, *Odebrecht Construction, Inc., v. Secretary, Florida Department of Transportation*, 715 F.3d 1268 (11th Cir. 2014), this Section applies to any contract for goods or services of \$1 million or more:

The Contractor certifies that it is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List and that it does not have business operations in Cuba or Syria as provided in section 287.135, Florida Statutes (2014), as may be amended or revised. The City may terminate this Contract at the City's option if the Contractor is found to have submitted a false certification as provided under subsection (5) of section 287.135, Florida Statutes (2014), as may be amended or revised, or been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List or has been engaged in business operations in Cuba or Syria, as defined in Section 287.135, Florida Statutes (2014), as may be amended or revised.

GC - 25 - LOCATION OF UNDERGROUND FACILITIES - If the Proposer, for the purpose of responding to this solicitation, requests the location of underground facilities through the Sunshine State One-Call of Florida, Inc. notification system or through any person or entity providing a facility locating service, and underground facilities are marked with paint, stakes or other markings within the City pursuant to such a request, then the Proposer shall be deemed non-responsive to this solicitation in accordance with Section 2-184(5) of the City of Fort Lauderdale Code of Ordinances.

GC - 26 – USE OF FLORIDA LUMBER TIMBER AND OTHER FOREST PRODUCTS - In accordance with Florida Statute 255.20 (3), The City specifies that lumber, timber, and other forest products used for this project shall be produced and manufactured in the state of Florida if such products are available and their price, fitness, and quality are equal. This requirement does not apply to plywood specified for monolithic concrete forms, if the structural or service requirements for timber for a particular job cannot be supplied by native species, or if the construction is financed in whole or in part from federal funds with the requirement that there be no restrictions as to species or place of manufacture.

The Bidder affirms by submitting a bid response to this solicitation that they will comply with section 255.20 (3) Florida Statutes.

GC – 27 – PUBLIC RECORDS - Contractor shall:

- a) Keep and maintain public records that ordinarily and necessarily would be required by the City in order to perform the service.
- (b) Provide the public with access to public records on the same terms and conditions that the City would provide the records and at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes (2013), as may be amended or revised, or as otherwise provided by law.
- (c) Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law.

(d) Meet all requirements for retaining public records and transfer, at no cost, to the City, all public records in possession of the contractor upon termination of this contract and destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. All records stored electronically must be provided to the City in a format that is compatible with the information technology systems of the City.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT:

Name: Stan Edwards

Mailing Address: 100 N. Andrews Avenue, 4th Floor, Ft. Lauderdale, FL 33301

Telephone Number: (954) 828-5071

E-mail Address: sedwards@fortlauderdale.gov

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01001
GENERAL REQUIREMENTS****PART 1 PROJECT DESCRIPTION****1.01 GENERAL**

- A. A brief description of the Work is stated in the INVITATION TO BID. To determine the full scope of the Project or any particular part of the Project, coordinate the applicable information in these Contract Documents and review the available project drawings.
- B. The Work under this Contract shall be performed by the Contractor as required by the Owner. Work will be authorized by a Notice to Proceed issued to the Contractor. The Contractor shall complete all work within the number of calendar days stipulated in the Contract unless an extension in the time of completion is granted by the ENGINEER. Upon satisfactory completion of the work and compliance with applicable provisions in the Contract Documents, the Contractor will receive final payment for all work done.
- C. The following additional information, though not all-inclusive, is given to assist contractors in their evaluation of the work required to meet the project objectives.
- D. The Contractor shall become familiar with the existing operating conditions of the Owner's water system, sewage transmission system and pumping stations and take such into consideration in planning and scheduling work. No extra claims shall be made for work required to achieve conditions beyond those obtainable under normal operation of the existing transmission, collection and pumping facilities necessary to accomplish the Work.

1.02 DOT SPECIFICATIONS

- A. Portions of The Florida Department of Transportation Standard Specifications for Road and Bridge Construction and their Roadway and Traffic Design Standards, hereinafter referred to as the DOT Standard Specifications, are referred to herein and amended, in part, and the same are hereby made a part of this Contract to the extent of such references and shall be as binding upon the Contract as though reproduced herein. Such reference shall mean the current edition, including all supplements. In case of a conflict in the requirements of the DOT Specifications and the requirements stated herein, the requirements herein shall prevail.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Contractor shall be required to submit MOTs for work in the county and state highways and City streets. Contractor shall coordinate with MOTs for nearby or highway work and obtain approval for all traffic control as required by the permits contained elsewhere in this Section.

PART 2 SEQUENCE OF OPERATIONS**2.01 SCHEDULING**

- A. General: Prepare and submit schedule in accordance with the provisions of Section 01310, Progress Schedules.
- B. Plan the Work and carry it out with minimum interference to the operation of the existing facilities. Prior to starting the work, confer with the ENGINEER to develop an approved work schedule which will permit the facilities to function normally as practical. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions. The Contractor shall do this work at such times, and at no additional cost to the Owner. Do not make connections between existing work and new work until necessary inspection and tests have been completed on the new work and it is found to conform in all respects to the requirements of the Contract Documents.
- C. No work shall be started until the Contractor has received approved shop drawings, established material/delivery dates for all equipment, and received approval of the construction schedule from the ENGINEER. The Contractor shall have sufficient manpower, equipment, and material to complete the project.
- D. No work shall commence without express consent of the ENGINEER.
- E. If a privately owned staging area is required, no work shall commence until approval of the facility is obtained from City Planning and Zoning in accordance with Section 47-19.2 of the Unified Land Development Regulations. Submit a copy of the approval and agreement to the ENGINEER.

2.02 MOBILIZATION AND DEMOBILIZATION

- A. Contractor shall be responsible for mobilization and demobilization of labor, materials and equipment. Payment for mobilization and demobilization shall be included in the lump sum price indicated in the Proposal for the Project.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.03 COORDINATION

- A. Contractor shall cooperate in the coordination of separate activities in a manner that will provide the least interference with the Owner's operations and other contractors and utility companies working in the area, and in the interfacing and connection of the separate elements of the overall project work.
- B. If any difficulty or dispute should arise in the accomplishment of the above, the problem shall be brought immediately to the attention of the ENGINEER.

2.04 SHUTDOWN OF EXISTING OPERATIONS OR UTILITIES

- A. Continuous operation of the Owner's service functions is of critical importance. The Contractor's work shall not result in the interruption of sewage, water, or solid waste service to any customers.
- B. Minimizing conflicts with the ongoing area-wide commercial activities is of critical importance. The Contractor's work shall minimize the interruption of operations at any facility or business.
- C. Connections to existing services or utilities, or other work that requires the temporary shutdown of any existing operations or utilities shall be planned in detail with appropriate scheduling of the work and coordinated with the ENGINEER. Two business days advanced notice shall be given in order that the ENGINEER may witness the shutdown, tie-in, and startup. The temporary shutdown must be approved by the Owner. All tie-in and bypass operations shall be the responsibility of the Contractor and are considered incidental to the cost of construction and provided at no additional cost to the Owner.
- D. All materials and equipment (including emergency equipment) necessary to expedite the tie-in shall be on hand and in proper working order prior to the shutdown of existing services or utilities.

2.05 OPERATION OF EXISTING SYSTEM PROHIBITED

- A. At no time undertake to close off any utility lines or open valves or take any other action which would affect the operation of existing systems. The Owner's forces will operate all valves. Provide at least one business day notice to Owner prior to any operations.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.06 BYPASS PUMPING

- A. Wastewater flows shall be controlled through the pipeline sections and pump stations where work is being performed. Under no circumstances, can portions of the system be removed from service for periods of time in excess of that approved by the Owner. The Contractor shall be responsible to assess conditions and capacities of the existing sewer lines and pump stations and accommodate it in the project workplan in order to implement an acceptable bypass plan at no additional cost to the Owner. Bypass pumping will be required for all sewer and pump station reconstruction that would result in shutdown of existing facilities. The Contractor shall supply the necessary pumps, conduits, and other equipment to not only divert flow around the pump station, manhole or pipe section in which work is to be performed, but also to transmit the flow in downstream sewer lines and/or pump stations without surcharge. The bypass systems shall be of sufficient capacity to handle existing flows plus additional flows that may occur during periods of high tide or rainfall. Primary bypass pumps shall be electrically driven. Emergency backup pumping capability must be available in addition to the primary bypass system. The Contractor will be responsible for furnishing the necessary labor, power, and supervision to set up and operate the pumping and bypass systems. When pumping is in operation, all engines shall be equipped in a manner to keep the pump noise to a minimum and comply with the City noise ordinances.
- B. Bypass pumping operations shall comply with all applicable City ordinances.
- C. The Contractor shall be responsible for any damage to properties or buildings connected to the sewer system, and to the pipeline, which result from the flow control activities.
- D. The Contractor shall submit a bypass pumping plan for all proposed bypass pumping operations.

PART 3 SITE CONDITIONS

3.01 SITE INVESTIGATION AND REPRESENTATION

- A. The Contractor acknowledges satisfaction as to the general nature and location of the work, the general and local conditions, particularly those bearing upon availability of transportation, availability of labor, water, electric power, roads, and uncertainties of weather, river stages, or similar physical conditions, the character of equipment and facilities needed preliminary to and during the prosecution of the work, and all other matters which can in any way affect the work or the cost thereof under this Contract.
- B. Failure by the Contractor to become acquainted with the physical conditions and all the available information will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of successfully performing the Work.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. The Contractor warrants that as a result of examination and investigation of all the aforesaid data, the Contractor can perform the work in a good and workmanlike manner and to the satisfaction of the Owner. The Owner assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this Contract, unless (1) such representations are expressly stated in the Contract, and (2) the Contract expressly provides that the responsibility therefore is assumed by the Owner.

3.02 INFORMATION ON SITE CONDITIONS

- A. General: Information obtained by the ENGINEER regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities as applicable, are contained within the project documents. The ENGINEER does not assume any responsibility for the completeness or interpretation of the information.

3.03 UTILITIES

- A. The Contractor shall be responsible for determining and/or confirming, at his cost, the locations of all utilities within the project area, and shall be responsible for contacting each utility for location and notification prior to commencing work.
- B. The Contractor shall contact potentially affected utilities as provided in Section 01040, Coordination.
- C. The Contractor shall contact Sunshine 811 or visit <http://www.sunshine811.com> at least 2 business days (10 business days for water crossings) prior to any excavation and make arrangements for locating all utilities in the project area.

3.04 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

- A. Where the Contractor's operations could cause damage or inconvenience to utilities, telephone, television, power, water, or sewer systems, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the Contractor with the owner of the utility affected.
- B. Notify all utility offices which are affected by the construction operation at least 2 business days in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.
- C. The Contractor shall be solely and directly responsible to the Owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Neither the Owner nor its officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the Work.
- E. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted.
- F. In the event the Contractor encounters water service lines or sewer laterals that interfere with trenching, he may, by obtaining prior approval of the property owner, the ENGINEER, cut the service, dig through, and restore the service with similar and equal materials at the Contractor's expense.
- G. The Contractor shall replace, at his own expense, all existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract documents or ordered by the Engineer.
- H. Telephone and communications drops and signal systems may extend throughout the project area. Properly located cable, conduit, interface equipment, pull or junction boxes and other signal or systems equipment damaged by the Contractor shall be replaced at the Contractor's expense.
 - 1. Damaged cable shall be replaced as an entire run, from junction box to junction box.
 - 2. Notify Broward County Engineering two business days in advance of the need to remove traffic detection loops.
 - 3. Contractor shall verify marked cables and signal systems prior to excavation.

3.05 INTERFERING STRUCTURES

- A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground.
- B. Protect underground and aboveground existing structures from damage, whether or not they lie within the limits of the easements obtained by the Owner. Where such existing fences, gates, sheds, buildings, or any other structure must be removed in order to properly carry out the construction, or are damaged during construction, restore to their original condition to the satisfaction of the property owner involved at the Contractor's own expense. Notify the Engineer of any damaged underground structure, and make repairs or replacements before backfilling.
- C. Without additional compensation, the Contractor may remove and shall replace in a condition as good as or better than original, such small miscellaneous structures as fences, mailboxes, and signposts that interfere with the Contractor's operations.

GENERAL REQUIREMENTS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.06 EASEMENTS AND WORK ON PRIVATE PROPERTY

- A. Where portions of the work are located on public or private property, easements and permits will be obtained by the Owner, except as otherwise noted in these Specifications. Easements will provide for the use of property for construction purposes to the extent indicated on the easements. Copies of these easements and permits are available upon request to the Owner. It shall be the Contractor's responsibility to determine the adequacy of the easement obtained in every case and to abide by all requirements and provisions of the easement. The Contractor shall confine his construction operations to within the easement limits or street right-of-way limits or make special arrangements with the property owners or appropriate public agency for the additional area required. Any damage to property, either inside or outside the limits of the easements provided by the Owner or street rights-of-way, shall be the responsibility of the Contractor as specified herein. The Contractor shall provide immediate notice to the OWNER of any damage to fencing and provide temporary fencing as required to provide a functionally similar level of security. The Contractor shall remove, protect, and replace all fences or other items encountered on public or private property. Before final payment will be authorized by the Engineer, the Contractor will be required to furnish the Owner with written releases from property owners or public agencies where side agreements or special easements have been made by the Contractor or where the Contractor's operations, for any reason, have not been kept within the construction right-of-way obtained by the Owner or the street right-of-way.
- B. The Contractor shall be responsible for all damage to private property where work related activities have occurred without proper easement or authorization. The City may withhold payment to the Contractor pending resolution of any claims by private owners.
- C. It is anticipated that the required easements and permits will be obtained before construction is started. However, should the procurement of any easement or permit be delayed, the Contractor shall schedule and perform the work around these areas until such a time as the easement or permit has been secured.
- D. Prior to removing an existing structure or item, provide written notice to the Owner at least 14 days in advance of the anticipated removal.
- E. The Contractor shall not engage in private construction activities within the project area without the presence of a contract with the private owner of the property containing a hold harmless clause protecting the City from any and all damages that occur during the performance of the privately authorized work.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 4 SAFETY AND CONVENIENCE**4.01 SAFETY AND ACCESS**

- A. The Contractor shall do all work necessary to protect the general public from hazards, including, but not limited to, surface irregularities or unramped grade changes in pedestrian sidewalk or walkway, and trenches or excavations in roadway. Barricades, lanterns, and proper signs shall be furnished in sufficient amount to safeguard the public and the work. All barricades and signs shall be clean and serviceable, in the opinion of the Engineer.
- B. During construction, the Contractor shall construct and at all times maintain satisfactory and substantial temporary chain link fencing, solid fencing, railing, barricades or steel plates, as applicable, at all openings, obstructions, or other hazards in streets, sidewalks, floors, roofs, and walkways. All such barriers shall have adequate warning lights as necessary, or required, for safety. All lights shall be regularly maintained, and in a fully operational state at all times.
- C. The Contractor shall notify all residences and businesses of planned construction at least 5 (five) business days prior to the start of work in the block where they are located. Such notices shall be brochures or door-hangers with sufficient information to describe the extent and duration of the planned work. Notification activities shall be coordinated with the ENGINEER.
- D. Homeowners and business owners shall be provided reasonable access. The Contractor shall provide temporary sidewalks, bridges or driveway access, including safe passage over open excavations as required.

4.02 ACCIDENT REPORTS

- A. In addition, the Contractor must promptly report in writing to the ENGINEER all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the ENGINEER.
- B. If a claim is made by anyone against the contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the ENGINEER, giving full details of the claim.

4.03 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

- A. Authorized representatives of the state, federal, or local governmental agencies, shall at all times have safe access to the work, and the Contractor shall provide proper facilities for such access and inspection.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4.04 PROTECTION OF PROPERTY

- A. Protect stored materials located adjacent to the proposed work. Notify property owners affected by the construction at least two business days in advance of the time construction begins. During construction operations, construct and maintain such facilities as may be required to provide access by all property owners to their property. No person shall be cut off from access to his residence or place of business for a period exceeding 2 hours, unless the Contractor has made special arrangements with the affected persons.
- B. The Contractor shall identify and isolate his active work zone in such a manner as to exclude all personnel not employed by him, the ENGINEER, and the Owner.

4.05 FIRE PREVENTION AND PROTECTION

- A. The Contractor shall perform all work in a fire-safe manner. He shall supply and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires. The Contractor shall comply with applicable federal, state, and local fire-prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241) shall be followed.

4.06 ACCESS FOR POLICE, FIRE, AND POSTAL SERVICE

- A. Notify the fire department and police department before closing any street or portion thereof. No closing shall be made without the Owner's approval of MOT plan. Notify said departments when the streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without special written permission from the fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. MOT plans that result in restricted access for emergency vehicles must be submitted and approved 2 weeks prior to the proposed closing with separate and specific notification made to the ENGINEER to provide for appropriate agency coordination.
- B. The Contractor shall leave a night emergency telephone number or numbers with the police department, the Engineer, and the Owner, so that contact may be made easily at all times in case of barricade and flare trouble or other emergencies.
- C. Maintain postal service facilities in accordance with the requirements of the U.S. Postal Service. Move mailboxes to temporary locations designated by the U.S. Postal Service, and at the completion of the work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

GENERAL REQUIREMENTS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 5 PRESERVATION, RESTORATION, AND CLEANUP**5.01 SITE RESTORATION AND CLEANUP**

- A. At all times during the work, keep the premises clean and orderly, and upon completion of the Work, repair all damage caused by equipment and leave the project free of rubbish or excess materials of any kind.
- B. Stockpile excavated materials in a manner that will cause the least damage to adjacent lawns, grassed areas, gardens, shrubbery, or fences, regardless of whether these are on private property, or on state, county, or city rights-of-way. Remove all excavated materials from grassed and planted areas, and leave these surfaces in a condition equivalent to their original condition. Replace excavated areas as specified in Section 02320, Trench Backfill, raked and graded to conform to their original contours.

5.02 FINISHING OF SITE, BORROW, AND STORAGE AREAS

- A. Upon completion of the project, all areas used by the Contractor shall be properly cleared of all temporary structures, rubbish, and waste materials and properly graded to drain and blend in with the abutting property. Areas used for the deposit of waste materials shall be finished to properly drain and blend with the surrounding terrain. Grassed areas shall be restored as specified.

5.03 HISTORIC PRESERVATION

- A. If the project work should uncover prehistoric or historic artifacts associated with Native American cultures, early colonial cultures, or American settlements, all project activities in the area shall cease immediately.
- B. All such discoveries shall be reported to the Division of Historical Resources. Review and Compliance Section at (800) 847-7278.
- C. Project activities in the affected area cannot resume without authorization from the Division of Historic Resources.

PART 6 PERMITS**6.01 GENERAL**

- A. Permits To Be Obtained by the Owner Include the Following:
 - 1. BCEPD: Collection/transmission system and pump station construction.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Owner has prepared the following application for the contractor to submit and pull a permit:
1. City of Fort Lauderdale Building permit
- C. Permits to be Obtained by the Contractor Include, but Are Not Limited to the following:
1. Local and County Building permits.
 2. Local, County, and State contracting licenses.
 3. MOT approval from local, county, and state agencies as required.
 4. BCEPD: Dewatering permit, including NPDES permit if required.
- D. The Contractor shall comply with all applicable permit conditions.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01005
INTENT OF DRAWINGS AND SPECIFICATIONS**

- A. Intent of specifications and drawings is to cover an installation complete in every respect. It is not intended to give every detail on drawings and in specifications. The OWNER will not be responsible for absence of any detail which the CONTRACTOR may require, nor for any special construction which may be found necessary as work progresses. If an item is either indicated or specified, it shall be considered sufficient for inclusion of said item in contract. The CONTRACTOR shall furnish and install materials and equipment usually furnished with such systems, and as needed to complete an operating installation, whether mentioned or not, which are customary to its trade.
- B. Incidental accessories not usually shown or specified but which are necessary for the proper installation and operation shall be included in work without additional cost to the OWNER, the same as if herein specified.
- C. Any apparatus, appliance, material or work not shown on but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and ready for operation, shall be furnished, delivered, and installed by the CONTRACTOR without additional cost to the OWNER.
- D. Drawings are diagrammatic and indicate the general arrangement of systems and work indicated (do not scale the drawings). Consult the OWNER or ENGINEER for exact locations of fixtures, appurtenances, etc., where these items are not definitely located on the drawings.
- E. The OWNER's or ENGINEER's interpretation of drawings and specifications shall be final and binding upon Contractor.
- F. The CONTRACTOR shall visit site prior to submitting bid, and thoroughly investigate and verify all conditions under which work shall be performed.

END OF SECTION

PROJECT 11880

**SECTION 01010
SUMMARY OF WORK****PART 1 GENERAL****1.01 WORK COVERED BY CONTRACT DOCUMENTS**

A. The completed Work will provide the OWNER with a renovated wastewater pump station acceptable to the City and the permitting authorities, and a force main connection to the City's transmission system, and includes, but is not limited to the following project components:

1. New pumps, piping, valves and electrical controls;
2. Force main connection to existing system;
3. Rehabilitation of the wet-well;
4. Improvements to the pump station, including concrete repairs, painting, new ventilation system including new air grilles and new air intake;
5. Site and roadway restoration;
6. Providing for maintenance of traffic;
7. Permanent station by-pass connection point.

1.02 WORK NOT COVERED BY CONTRACT DOCUMENTS (NOT USED)**PART 2 PRODUCTS (NOT USED)****PART 3 EXECUTION****3.01 SEQUENCE OF WORK**

A. The Work shall proceed in such a manner as to avoid disruption to existing operations, provide coordination with other related projects, and to minimize impacts on adjacent property owners.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01025
MEASUREMENT AND PAYMENT****PART 1 GENERAL****1.1 SUBMITTALS****A. Informational:**

1. Submit schedule on OWNER's form.
2. Application for Payment.
3. Final Application for Payment.

1.2 SCHEDULE

- A. Prepare a schedule for the Work in accordance with the requirements of Section 01310.
- B. Unit Price Work: Reflect unit price quantity and price breakdown from the conformed Bid Form
- C. Lump Sum Work:
 1. Reflect schedule format included in conformed Bid Form.
 2. List Bonds and insurance premiums, mobilization, demobilization, facility startup, allowance items and contract closeout separately.
 3. Break down by Divisions 2 through 16 with appropriate subdivision of each Specification.
- D. An unbalanced or front-end loaded schedule will not be acceptable.
- E. Summation of all the Work shall equal the Contract Price.

1.3 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment. Execute certification by authorized officer of CONTRACTOR.
- B. Use detailed Application for Payment Form provided by ENGINEER.

MEASUREMENT AND PAYMENT

01025-1
CAM 16-1224
EXHIBIT 4
Page 92 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Include each portion of Work and the unit price breakdown for the Work to be paid on unit price basis, and a listing of OWNER selected equipment, if applicable, and allowances, as appropriate.
- D. Preparation:
 - 1. Round values to nearest dollar.
 - 2. List each Change Order and Written Amendment executed prior to date of submission as separate line item. Totals to equal those shown on the Transmittal Summary Form.
 - 3. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form, (4 copies), a listing of materials on hand as applicable, and such supporting data as may be requested by ENGINEER.

1.4 MEASUREMENT - GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and Specifications as specified in National Institute of Standards and Technology, Handbook 44.
- B. Whenever pay quantities of material are determined by weight, material shall be weighed on scales furnished by CONTRACTOR and certified accurate by state agency responsible. Weight or load slip shall be obtained from weigher and delivered to ENGINEER or OWNER's representative at point of delivery of material.
- C. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by ENGINEER. Each vehicle shall bear a plainly legible identification mark.
- E. Materials that are specified for measurement by the cubic yard measured in the vehicle shall be hauled in vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Vehicles not meeting above requirements or loads of quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- F. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on

MEASUREMENT AND PAYMENT

01025-2

CAM 16-1224

EXHIBIT 4

Page 93 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.

- G. Units of measure shown on Bid Form shall be as follows, unless specified otherwise. All methods of measurement shall be approved by the ENGINEER.

ITEM	METHOD OF MEASUREMENT
AC	Acre – Field Measure
AL	Allowance
CY	Cubic Yard – Field Measure within limits specified or shown, or measured in vehicle by volume, as specified
EA	Each – Field Count
GAL	Gallon – Field Measure
HR	Hour
LB	Pound(s) – Weight Measure by Scale
LF	Linear Foot – Field Measure
LS	Lump Sum – Unit is one; no measurement will be made
SF	Square Foot
SY	Square Yard
TON	Ton – Weight Measure by Scale (2,000 pounds)

1.5 PAYMENT

A. General:

1. Progress payments will be made monthly.
2. The date for CONTRACTOR's submission of monthly Application for Payment shall be established at the Preconstruction Conference.
3. The CONTRACTOR shall be solely and directly responsible to the OWNER and operators of utilities, telephone, television, power, water, or sewer systems for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.

MEASUREMENT AND PAYMENT

01025-3

CAM 16-1224

EXHIBIT 4

Page 94 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Neither the OWNER nor its officers or agents shall be responsible to the CONTRACTOR for damages as a result of the CONTRACTOR's failure to protect utilities encountered in the Work.
5. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted.
6. In the event the CONTRACTOR encounters water service lines or sewer laterals that interfere with trenching, he may, by obtaining prior approval of the property owner, the ENGINEER and the OWNER, cut the service, dig through, and restore the service with similar and equal materials at the CONTRACTOR's expense.
7. The CONTRACTOR shall replace, at his own expense, all existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract documents or ordered by the City of Fort Lauderdale.
8. Telephone and communication drops and systems may extend throughout the project area. Properly located cable, conduit, interface equipment, pull or junction boxes and other signal or systems equipment damaged by the CONTRACTOR shall be replaced at the CONTRACTOR's expense. Damaged cable shall be replaced as an entire run, from junction box to junction box.
9. Protect underground and aboveground existing structures from damage, whether or not they lie within the limits of the easements obtained by the OWNER. Where such existing fences, gates, sheds, buildings, or any other structure must be removed in order to properly carry out the construction, or are damaged during construction, restore to their original condition to the satisfaction of the property owner involved at the CONTRACTOR's own expense. Notify the ENGINEER of any damaged underground structure, and make repairs or replacements before backfilling.
10. Without additional compensation, the CONTRACTOR may remove and shall replace in a condition as good as or better than original, such small miscellaneous structure as fences, irrigation systems, mailboxes, and signposts that interfere with the CONTRACTOR's operations.
11. Any damage to property, either inside or outside the limits of the easements provided by the OWNER or street rights-of-way, shall be the responsibility of the CONTRACTOR as specified herein. The CONTRACTOR shall provide immediate notice to the OWNER of any damage to fencing and provide temporary fencing as required to provide a functionally similar level of security. The CONTRACTOR shall remove, protect and replace all fences or other items encountered on public or private property. Before final payment will be authorized by the ENGINEER, the CONTRACTOR will be required to furnish the OWNER with written releases from property owners or public agencies where side agreements or special easements have been made by the CONTRACTOR or where the CONTRACTOR's operations, for any reason, have not been kept

MEASUREMENT AND PAYMENT

01025-4

CAM 16-1224

EXHIBIT 4

Page 95 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

within the construction right-of-way obtained by the OWNER or the street right-of-way.

12. The CONTRACTOR shall be responsible for all damage to private property where work related activities have occurred without proper easement or authorization. The CITY may withhold payment to the CONTRACTOR pending resolution of any claims by private owners.

B. General:

1. No material price increases will be allowed, including gasoline, diesel, asphalt cement, or other materials.

C. Payment for Lump Sum Work covers all Work specified or shown for the following items:

- D. Mobilization and Demobilization: There shall be no separate payment for mobilization and demobilization. Contractor shall include for such in all the separate pay items for the works. Mobilization and demobilization includes, but is not limited to, bonds, videos, insurance, site cleanup, sanitation facilities, labor associated with permit acquisition, contractor's staging area, project signs, flyers, project fence, testing, project coordination, etc.

1. LUMP SUM

ITEM	DESCRIPTION
1-a) Maintenance of Traffic	<p>Payment for maintenance of traffic will be made at the lump sum price named in the Bid Schedule. Payment for maintenance of traffic will be made in equal monthly amounts for the project duration stated in the Contract.</p> <p>The lump sum price for this item shall include full compensation for all maintenance of traffic, including, but not limited to, all labor, equipment, and material required to keep roadways and property accesses in service during construction activities as specified in the Contract Documents and as required by FDOT, County, City, or local authorities. The Contractor's lump sum price shall include full compensation for preparation of maintenance of traffic plans (MOTs), for all personnel required to direct and maintain traffic (including local police as required), and all signs, cones, barricades, and temporary traffic lights, concrete jersey barriers, variable message signs(VMS), temporary pavement markings, RPM's, etc. Additionally, this item shall include all costs associated with reduced or changed hours due to construction in school zones and all costs associated with the coordination of all other work underway at the same time</p>

MEASUREMENT AND PAYMENT

01025-5

CAM 16-1224

EXHIBIT 4

Page 96 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ITEM	DESCRIPTION
1-a) cont'd	(city, county, state) within the project limits. 1-a Maintenance of Traffic LS
1-b) Allowance for Permit Fees	<p>Payment for permit fees will be based upon the actual permit fees required by the CONTRACTOR from the various agencies having jurisdiction for construction of the project, in accordance with the Contract Documents.</p> <p>The allowance amount shown on the contract is an estimate for the project and is a cost pass through item and no markups will be added to this item. The CONTRACTOR shall submit paid receipts with pay request verifying actual cost. Only permit fees substantiated by the CONTRACTOR and approved by the Project Manager will be paid as part of this bid item. Any balance in this item at the end of the project shall be credited back to the OWNER.</p> <p>1-b Permit Allowance AL</p>
1-c) Allowance for Electrical Service Modifications and Utility Relocations	<p>Payment for electrical service modifications and utility relocations, excluding any modifications specifically shown in the Contract Documents, will be based upon the actual costs incurred by the CONTRACTOR to modify the electrical service as required by Florida Power and Light (FP&L), or actual cost of other utility relocations in accordance with the Contract Documents. The allowance amount shown on the Bid Schedule is an estimate of electrical service modification's provision of 3-phase power, utility relocations costs required for the Project, and is a cost pass through item and no markups will be added to this item. The CONTRACTOR shall produce documentation upon request verifying actual cost. Only electrical service modifications and utility relocations costs substantiated by the CONTRACTOR and approved by the Project Manager will be paid as part of this bid item.</p> <p>1-c Electrical Service Modifications Allowance AL</p>
1-d) Landscape Allowance	<p>Payment will be based on a time and material basis. This work will not be a basis for a time extension.</p> <p>Payment for landscaping (for screening) as directed by the Project Manager, will be made from this allowance item based on time and material.</p> <p>This pay item shall be used solely at the discretion and direction of the Project Manager and shall not relieve the contractor of responsibility to protect properties</p> <p>ITEM DESCRIPTION</p>

MEASUREMENT AND PAYMENT

01025-6

CAM 16-1224

EXHIBIT 4

Page 97 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1-d) cont'd	<p>and existing landscapes from damage due to construction operations.</p> <p>The CONTRACTOR shall submit documentation with a pay request verifying actual cost. Only costs substantiated by the CONTRACTOR and approved by the Project Manager will be paid as part of this bid item. Any balance in this item at the end of the project shall be credited back to the OWNER.</p> <p>1-d Landscape Allowance AL</p>
-------------	---

MEASUREMENT AND PAYMENT

01025-7
CAM 16-1224
EXHIBIT 4
Page 98 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. SANITARY

Payment for unit price items covers all the work necessary to furnish and install the following items:

ITEM	DESCRIPTION
2-a) Furnish and Install Material, Labor, and Equipment for Rehabilitation of wastewater pump station, A-12	<p>Measurement for payment to construct the sanitary sewer pump station rehabilitation/retrofit will be based upon the lump sum price named in the Bid Schedule, in accordance with the requirements of the Contract Documents.</p> <p>Payment for furnishing and installing the sanitary sewer pump station rehabilitation/retrofit will be made at the lump sum price, named in the Bid Schedule, and will be made equivalent to the percent complete of the pump station and force main as determined by the Project Manager, as of the date of the pay request. The lump sum price shall constitute full compensation for rehabilitation of the sanitary sewer pump station complete as shown on the drawings and listed in the specifications, including but not limited to, site work, fill, excavation including rock excavation, dewatering, sheeting and all excavation support to comply with the Trench Safety Act, rock removal, backfill and compaction, construction and installation of reinforced concrete structures, protection of utilities, suction and [ST1] discharge force main, tie-ins to [ST2] pressure pipelines, piping, valves, appurtenances, pump station by-pass pumping, pressure testing, pumps, control panel, electric service and temporary power, electrical equipment, electrical conduit and wiring, water service, hose bib, backflow preventer, [ST3] fittings, couplings, pipe supports, hatches, ladders, grates, structural modifications, concrete repairs (except where indicated to be paid separately), pump-out connections (temporary and permanent), installation of equipment, instrumentation, HVAC, patching and painting, lead paint abatement, and all other [ST4] appurtenances and all site restoration of work disturbed by construction, and daily cleaning. Pump station shall be complete, energized and operational. Concrete repairs to wet wells are paid separately.</p> <p>The rehabilitation of Station A-12 also includes the demolition and disposal of all the equipment of the existing station, including all mechanical, electrical, ventilation, miscellaneous equipment, and appurtenances as indicated on the drawings. The intent</p>

MEASUREMENT AND PAYMENT

01025-8

CAM 16-1224

EXHIBIT 4

Page 99 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ITEM	DESCRIPTION
2-a) cont'd	<p>is the complete demolition and replacement of existing facilities.</p> <p>2-a Pump Station A-12 LS</p>
2-b) Furnish and Install Pressure Pipe	<p>Measurement for payment to furnish and install pressure pipe will be based upon the number of linear feet of pipe actually constructed as determined by measurement along the centerline of the pipe in place in accordance with the requirements of the Contract Documents. Pipe cost shall include all specified linings and coatings.</p> <p>Payment for furnishing and installing pressure pipe will be made at the unit price, per linear foot of pipe, named in the Bid Schedule and includes, but is not limited to, transporting, storing, furnishing, and installing the pipe, excavation, excavation support to comply with the Trench Safety Act, dewatering, bedding, backfilling, and compaction, cleaning, testing, and all other specified work. There will be no additional compensation for excavation in rock material.</p> <p>Furnish and Install:</p> <p>2-b 12" DIP Class 350 restrained joint force main LF 2-b 6" DIP Class 350 restrained joint force main LF</p>
2-c) Additional By-pass Pumping	<p>Payment under this item shall be solely at the discretion and direction of the Project Manager. This item shall not relieve the contractor of responsibility for all by-pass pumping as required for the construction of work.</p> <p>Payment shall constitute full reimbursement for all costs associated with by-pass pumping, and will be made at the unit rate named in the Bid Schedule for the number of days ordered by the Project Manager.</p> <p>2-c Additional By-pass Pumping Day</p>
2-d) Furnish and Install Additional Foundation Stabilization, and/or Imported backfill material	<p>Measurement for payment to furnish and install additional special foundation stabilization (in excess of standard foundation stabilization) will be based upon the CY of additional stabilization material placed, in accordance with the requirements of the Contract Documents. Measurement for payment shall be based upon the "in-place" volume of material measured in the trench/excavation by Project Manager as specified herein.</p>

MEASUREMENT AND PAYMENT

01025-9

CAM 16-1224

EXHIBIT 4

Page 100 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ITEM	DESCRIPTION
2-d) cont'd	<p>Payment for furnishing and installing additional foundation stabilization will be made at the unit price, per cubic yard, which will constitute full compensation for a complete operation and including, but not limited to, all materials, labor, equipment, placing and compacting it in the trench for the extra depth of trench excavation required below the pipe base grade to provide for a stable base for the pipe or other structure, disposing of surplus or unsuitable material, and all other work incidental to constructing the pipe. This item is to compensate the contractor for the excavation, removal and disposal of unsuitable material and replacement with suitable material beyond the limits of the standard trench excavation (i.e. muck, clay, debris, or other material) and shall be used only with advance approval and authorization by specifically identified locations by the Project Manager.</p> <p>This item is also for reimbursement for furnishing and installing imported backfill material to replace unsuitable excavated material (muck, clay, debris or other material) under the same terms and conditions.</p> <p>2-d Furnish and Install Foundation Stabilization and/or imported backfill material CY</p>
2-e) Furnish and Install Ductile Iron Pipe (DIP) Force Main Fittings	<p>Measurement for payment to furnish and install DIP fittings shall be at the unit price bid per pound for such fittings furnished in accordance with the Contract Documents. Weight shall be based on published weights provided by the fitting manufacturer.</p> <p>Payment for furnishing and installing fittings shall be at the unit price bid per pound, and shall constitute full compensation for all work required to furnish and install the fittings, provide joint restraint, and necessary material, tools, equipment, labor, excavation, dewatering, backfilling, transporting, storing, and clean up.</p> <p>2-e Furnish and Install DIP Force Main Fittings LB</p>
2-f) Additional Work	<p>Measurement for payment for labor, materials and equipment, for additional work that may be ordered by the Project Manager, e.g. due to the retrofit nature of the work.</p> <p>Materials shall be reimbursed with a percent mark-up to include all direct and indirect costs associated with purchase, delivery, storage, handling, and profit. The mark-up percent for materials shall be 5%.</p>

MEASUREMENT AND PAYMENT

01025-10

CAM 16-1224

EXHIBIT 4

Page 101 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ITEM	DESCRIPTION								
2-f) cont'd	<p>Labor amount will include all direct and indirect costs associated with labor, benefits, and profit. Contractor and Project Manager must first negotiate additional labor scope of work.</p> <p>Equipment shall be reimbursed for actual rental cost plus a five percent (5%) mark-up on such cost. No overhead, profit, or other mark-up shall be reimbursed in this allowance. Contractor shall submit copies of invoices which documents costs for rental equipment.</p> <p>Only additional work or additional costs that are authorized and agreed by the Project Manager shall be paid. This item shall be solely at the discretion of the Project Manager.</p> <p>2-f Additional Work AL</p>								
2-g) Install Cured-In-Place Mainline Liner	<p>Measurement for payment of furnishing and installing mainline liner will be based upon the actual quantity of linear feet of sewer main installed.</p> <p>Payment for furnishing and installing liner will be made at the unit price, per linear foot of pipe identified in the Bid Schedule and includes but is not limited to all transportation costs, storing, mobilization and demobilization costs, furnishing and installing all necessary components, cleaning, CCTV inspections, bypass pumping, all laboratory testing, field testing, restoration of property disturbed during the lining operation, and all other specified work in accordance with Section 02765 CURED-IN-PLACE PIPE LINING.</p> <p>Furnish and Install:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 80%;">8-inch x 6.0mm CIPP Liner</td><td style="text-align: right;">LF</td></tr> <tr> <td>8-inch x 1.5mm thickness increase</td><td style="text-align: right;">LF</td></tr> <tr> <td>16-inch x 9.0mm CIPP Liner</td><td style="text-align: right;">LF</td></tr> <tr> <td>16-inch x 1.5mm thickness increase</td><td style="text-align: right;">LF</td></tr> </table>	8-inch x 6.0mm CIPP Liner	LF	8-inch x 1.5mm thickness increase	LF	16-inch x 9.0mm CIPP Liner	LF	16-inch x 1.5mm thickness increase	LF
8-inch x 6.0mm CIPP Liner	LF								
8-inch x 1.5mm thickness increase	LF								
16-inch x 9.0mm CIPP Liner	LF								
16-inch x 1.5mm thickness increase	LF								
2-h) Mechanical Tuberculation Removal	<p>Measurement for payment for Mechanical Tuberculation Removal will be based upon the actual quantity of linear feet of lateral or mainline sewer cleaned as requested in writing by OWNER, as measured in the field.</p> <p>Payment for additional cleaning will be made at the unit price identified in the Bid Schedule, and includes but is not limited to mobilization and demobilization costs, cleaning, and all other effort required to perform the Work in accordance with section 02751.</p>								

MEASUREMENT AND PAYMENT

01025-11

CAM 16-1224

EXHIBIT 4

Page 102 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ITEM	DESCRIPTION
2-h) cont'd	2-h Mechanical tuberculation removal (8" to 10") LF Mechanical tuberculation removal (16") LF
2-i) Seal visible infiltration with AV-202 through manhole walls, bench and invert	<p>Measurement for payment to seal visible infiltration using AV-202 will be based upon the actual quantity of material used and verified by CITY representative.</p> <p>Payment will be made at the unit price per gallon as identified in the Bid Schedule and includes but is not limited to all transportation costs, storing, mobilization and demobilization costs, furnishing and installing all necessary components, all laboratory testing, field testing, restoration of property disturbed, and all other specified work in accordance with Section 02655 NON-STRUCTURAL MANHOLE LINING.</p> <p>2-i Seal visible infiltration in manhole (8-16 foot deep) GAL</p>
2-j) Repair manhole bench and invert	<p>Measurement for payment to repair manhole bench and invert will be based upon the actual quantity of repairs performed.</p> <p>Payment will be made at the unit price per each manhole invert repaired. Payment of the unit price will provide compensation for cleaning injecting hydrophilic grout to stop active infiltration, if necessary; and patching the manhole bench and flow channels, isolation of the manhole by plugging entering lines, testing, labor, tools, and equipment and all incidentals and materials needed to restore the manhole bench and invert, in accordance with section 02958 MANHOLE REPAIRS.</p> <p>2-j Repair manhole bench and invert EA</p>
2-k) Provide and install manhole coating/liner	<p>Measurement for payment to provide and install manhole coating/liner will be based on the actual vertical feet of coating/liner installed.</p> <p>Payment will be made at the unit price per vertical foot of manhole wall for installation of spray-applied coating/liner on manhole interior surfaces. Measurement will be made from the bench, at its highest point, to the bottom of the frame. Payment of the unit price per vertical foot shall include all necessary cleaning, abrasive blasting, preparation of the interior manhole surfaces, drying of manhole surfaces, MOT, furnishing and supplying all of the materials or combination of materials making up the</p>

MEASUREMENT AND PAYMENT

01025-12

CAM 16-1224

EXHIBIT 4

Page 103 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

	spray-applied coating/liner; temporarily blocking or
ITEM	DESCRIPTION
2-k) cont'd	plugging incoming lines; removal, transportation, and disposal of material generated by cleaning and preparation activities; television surveys before and after installation, testing; cleanup; all labor, materials, equipment and all incidentals required to provide a complete and acceptable installation in accordance with section 02958 MANHOLE REPAIRS, 02958-01 IET COATING SYSTEM, AND/OR 02958-02 RAVEN COATING SYSTEM.
	2-k Provide and Install IET manhole coating/liner VF

3. WET-WELL REHABILITATION

ITEM	DESCRIPTION
3a-c) Complete Rehabilitation of Pump Station wet well as specified in Section 03720	<p>Measurement for payment for rehabilitation and repairs to existing wet wells will be based on the actual number of square feet. The square footage will be determined in the field and agreed to by the Contractor and Project Manager prior to any work being performed.</p> <p>Repairs shall be based on complete wet well rehabilitation.</p> <p>Payment includes, but is not limited to, all labor, equipment, materials, supervision, engineering, and overhead in accordance with the contract documents. This item is only to be used if directed, in writing, by the Project Manager.</p> <p>Wet Well Rehabilitation</p> <p>3-a Structural surface deterioration, no exposed Rebar SF</p> <p>3-b Additional cost to Item 3-a to repair deterioration with exposed rebar SF</p> <p>3-c Additional cost to Items 3-a and 3-b to repair deterioration with exposed and deteriorated rebar SF</p>

4. MISCELLANEOUS

MEASUREMENT AND PAYMENT

01025-13

CAM 16-1224

EXHIBIT 4

Page 104 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ITEM	DESCRIPTION
<p>4a-c) Furnish and Place Asphalt Concrete Pavement and Pavement Restoration</p>	<p>Measurement for payment of asphalt concrete pavement and pavement restoration will be based upon the number of square yards of asphalt concrete pavement actually placed, as detailed in the Drawings over pipelines, in accordance with the requirements of the Contract Documents.</p> <p>Payment for placement of limerock base course and asphalt concrete pavement, at the thickness indicated, will be made per square yard for placement as named and at the thickness indicated in the contract documents, and shall constitute full compensation for removal and disposal of existing asphalt pavement, furnishing and placing of limerock base course and asphalt concrete, including all transportation, handling, cleaning, positioning, compacting, and disposal of waste or unsuitable material, applying a prime coat, furnishing, placing, and compacting the asphalt surface or sand, complete in place to the cross section and thickness shown on the Drawings, including restoration of traffic loop detectors, restoration of pavement markings, adjustment of finished grades of manhole rims and valve boxes for mains which are proposed to remain in service, milling and removal of existing asphalt as required, and saw cutting of all pavement and all cleanup of the area disturbed by the construction.</p> <p>Payment for maintenance of traffic, including but not limited to, temporary striping between lifts of asphalt, shall be made under the maintenance of traffic item named in the Bid Schedule.</p> <p>4-a Furnish and place 1.5" thick asphalt concrete Pavement Type S3 SY</p> <p>4-b Mill up to 1" existing asphalt and place up to 1" thick asphalt concrete Pavement Type S3 SY</p> <p>4-c Furnish and place 12" thick limerock base Course SY</p>
ITEM	DESCRIPTION

MEASUREMENT AND PAYMENT

01025-14

CAM 16-1224

EXHIBIT 4

Page 105 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4 d-g) Right of Way Restoration	<p>Measurement and payment for restoration of right-of-way will be made at the prices named in the Bid Schedule and shall constitute full compensation for completing restoration work including but not limited to, restoration of driveways (asphalt) and swales, to original condition or better, resetting or replacement of landscape materials; reconstruction of sidewalks;</p> <p>This item includes but is not limited to, earthwork, limerock, limerock stabilization, compacting, grading, reshaping and stabilizing swales, disposal of excess material, demolition and disposal of existing sidewalks, and any appurtenant item for which separate payment is not specifically included in the Bid Schedule. Driveways require minimum 6" compacted limerock;</p> <p>4-d Strip and re-grade swale SY 4-e Sod restoration SY 4-f Concrete sidewalk LF 4-g Concrete curb, 6" x 16" LF</p>

5. ENVIRONMENTAL

ITEM	DESCRIPTION
5-a) Environmental Allowance	Should contaminated ground be encountered that requires remediation, this allowance item shall be used for reimbursement to the contractor for any required work activities, such as liquid hydrocarbon removal, contaminated soil removal and disposal, treatment of contaminated ground water, and laboratory sampling and analysis, on the basis of unit rates to be negotiated between the City and the contractor.

MEASUREMENT AND PAYMENT

01025-15

CAM 16-1224

EXHIBIT 4

Page 106 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.6 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for the following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of CONTRACTOR to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by OWNER.
6. Material remaining on hand after completion of Work.

1.7 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Partial Payment: No partial payments will be made for stored materials.

1.8 ALLOWANCES

- A. The allowances shall be used only at the discretion of and as ordered by the OWNER.
- B. Any portion of these allowances that remain after all authorized payments have been made, will be withheld from contract payments and will remain with the OWNER.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01040
COORDINATION****PART 1 GENERAL****1.01 SUBMITTALS****A. Informational:**

1. Statement of Qualification (SOQ) for land surveyor or civil engineer.
2. Statement of Qualification (SOQ) for professional videographer.
3. Photographs:
 - a. Color Prints: Submit two copies, accompanied by negatives or digital files, within 5 days of being taken.
 - b. Video Recordings: Submit two copies within 5 days of being taken.

1.02 UTILITY NOTIFICATION AND COORDINATION**A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work.**

1. Contact the City of Fort Lauderdale Public Services Department at 954-828-8000 for water and sewer utility locations.
2. Contact Sunshine State One Call at 1-800-432-4770 at least 2 business days prior to any excavation.

B. If damage occurs, or if conflicts or emergencies arise during Work, contact the appropriate utility.

1. Electricity Company: Florida Power and Light.
 - a. Contact Person: Trouble Center (or police/fire – 911).
 - b. Telephone: 954-797-5000.
2. Telephone Company: BellSouth.
 - a. Contact Person: Jason Boschen.
 - b. Telephone: 954-316-4005 or 954-605-1121.
3. Water and Sewer Department: Fort Lauderdale Public Services Department.
 - a. Contact Person: Emergency Hotline.
 - b. Telephone: 954-828-8000.
4. Gas Company: TECO Peoples Gas.
 - a. Contact Person: Dispatch.
 - b. Telephone: 305-957-3857, ext. 7490 or 1-877-832-6747.
5. Telecom: AT&T – Broadband/Comcast.
 - a. Contact: Andy Vaspasiano.
 - b. Telephone: 954-266-6589 or 954-444-2833.
6. Telecom: FP&L FiberNet.
 - a. Contact: Noel R. Reese.
 - b. Telephone: 305-552-3249 or 305-205-1283.

COORDINATION

01040-1224
EXHIBIT 4
Page 108 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

7. Broward County Traffic Engineering Division (For Traffic Signal Communications Systems Underground Cable and Traffic Loops):
 - a. Contact: Keith Smith.
 - b. Telephone: 954-484-9600, ext. 227.

1.03 PROJECT MEETINGS

A. General:

1. Engineer: Schedule physical arrangements for meetings throughout progress of Work, prepare meeting agenda with CITY ENGINEER, Owner and Contractor input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies minutes after each meeting to participants and parties affected by meeting decisions.
2. Representatives of CITY ENGINEER, Owner, Contractor, and Subcontractors shall attend meetings as needed.

B. Preconstruction Conference:

1. Contractor shall be prepared to discuss the following subjects, as a minimum:
 - a. Required schedules.
 - b. Status of Bonds and insurance.
 - c. Sequence of critical path work items.
 - d. Project changes and clarification procedures.
 - e. Use of site, access, office and storage areas, security and temporary facilities.
 - f. Major project delivery and priorities.
 - g. Contractor's safety plan and representative.
 - h. Progress payment procedures.
2. Attendees may include but not limited to:
 - a. Owner's representatives
 - b. CITY ENGINEER's representatives
 - c. Contractor's office representative
 - d. Contractor's resident superintendent
 - e. Contractor's quality control representative
 - f. Subcontractor's representatives whom Contractor may desire or CITY ENGINEER may request to attend.
 - g. Engineer's representatives.
 - h. Others as appropriate.

C. Preliminary Schedules Acceptability Review Meeting: As required to review and finalize Preliminary Schedule.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

D. Progress Meetings:

1. Engineer will schedule regular progress meetings at site, conducted weekly to review Work progress, progress schedule, Shop Drawing and Sample submissions schedule, Application for Payment, contract modifications, and other matters needing discussion and resolution.
2. Attendees will include:
 - a. Owner's representatives, as appropriate.
 - b. CITY ENGINEER, as appropriate.
 - c. Contractor, Subcontractors and Suppliers, as appropriate.
 - d. Engineer's representative(s).
 - e. Others as appropriate.
3. On a monthly basis, the CITY ENGINEER will conduct a meeting to review work completed the previous month versus the Progress Schedule, work planned for upcoming month based on the Progress Schedule, the monthly Application for Payment, and any outstanding issues related to performance of the Work including pending contract modifications, requests for clarification, Shop Drawings, etc. All parties will attend the monthly meeting.

E. Preinstallation Meetings:

1. When required in individual Specification sections or as necessary to coordinate the Work, convene at site prior to commencing Work of that section.
2. Require attendance of entities directly affecting, or affected by, Work of that section.
3. Notify CITY ENGINEER 4 days in advance of meeting date.
4. Provide suggested agenda to CITY ENGINEER to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

F. Other Meetings: In accordance with the Contract Documents and as may be required by the Owner, CITY ENGINEER, and Engineer.

1.04 FACILITY OPERATIONS

- A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
- B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.
- C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facilities.
- D. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

authorization will be considered within 48 hours after receipt of Contractor's written request.

- E. Provide **7** days advance written request for approval of need to shut down a process or facility to Owner and CITY ENGINEER.
- F. Power outages will be considered upon 48 hours written request to Owner and CITY ENGINEER. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.
- G. Do not proceed with Work affecting a facility's operation without obtaining Owner's and CITY ENGINEER's advance approval of the need for and duration of such Work.
- H. Relocation of Existing Facilities:
 - 1. During construction, it is expected that minor relocations of Work will be necessary.
 - 2. If Contractor determines that in order to expedite construction of new water and or sewer mains it would be necessary to temporarily remove and replace existing water services and/or sewer service connections, he will be responsible for the removal and replacement of such service connections at his own cost and effort. The City will not provide additional compensation for any costs associated with such effort. All labor and material costs associated with means and methods of construction will be compensated as part of the bid item(s) cost submitted by the Contractor. Additionally, the Contractor will have to coordinate and inform utility owner(s) and any City resident(s) impacted by such activities and must repair such utilities in a timely manner to minimize disruption of service.
 - 3. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, traffic loop detectors and other necessary items.
 - 4. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
 - 5. Perform relocations to minimize downtime of existing facilities.
 - 6. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by CITY ENGINEER.

1.05 BYPASS PUMPING

- A. Where the Work includes connections or modifications to existing sanitary sewer systems, wastewater flows shall be controlled through the pipeline sections and pump stations where work is being performed. Under no circumstances, can portions of the system be removed from service for periods of time in excess of that approved by the Owner. The Contractor shall be responsible to assess conditions and capacities of the existing sewerlines and pump stations in order to implement an acceptable bypass plan at no additional cost to the Owner. Bypass pumping will be required for all sewer and pump station construction that would result in shutdown of

COORDINATION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

existing facilities. The Contractor shall supply the necessary pumps, conduits, and other equipment to not only divert flow around the pump station, manhole, or pipe section in which work is to be performed, but also to transmit the flow in downstream sewerlines and/or pump stations without surcharge. The bypass systems shall be of sufficient capacity to handle existing flows plus additional flows that may occur during periods of high tide or rainfall. Emergency backup pumping capability must be available in addition to the primary bypass system. The Contractor will be responsible for furnishing the necessary labor, power, and supervision to set up and operate the pumping and bypass systems. When pumping is in operation, all engines shall be equipped in a manner to keep the pump noise to a minimum and to comply with applicable noise ordinances.

- B. Contractor shall be responsible for any damage to properties or buildings connected to the sewer system, and to the pipeline, which result from the flow control activities.
- C. Contractor shall submit a bypass pumping plan for all proposed bypass pumping operations.

1.06 PHYSICAL CONDITIONS

- A. Exercise reasonable care to verify locations of existing subsurface structures and underground facilities.
- B. Thoroughly check immediate and adjacent areas subject to excavation by visual examination (and by electronic metal and pipe detection equipment, as necessary) for indications of subsurface structures and underground facilities.
- C. Make exploratory excavations where existing underground facilities or structures may potentially conflict with proposed underground facilities or structures. Conduct exploratory excavations in presence of Engineer and sufficiently ahead of construction to avoid possible delays to Contractor's Work.

1.07 ADJACENT FACILITIES AND PROPERTIES

- A. Examination:
 - 1. After Effective Date of the Agreement and before Work at site is started, Contractor, CITY ENGINEER, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations, including neighboring properties.
 - 2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Documentation:

1. Record and submit documentation of observations made on examination inspections in accordance with paragraphs Construction Photographs and Audio-Video Recordings.
2. Upon receipt, Engineer will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.08 CONSTRUCTION PHOTOGRAPHS

- A. Photographically document all unique portions of the construction including tie-ins to existing pipelines or facilities, crossings of existing utilities, buried valve and piping intersections, and other work items that will not otherwise be visible after completion of construction.
- B. Film or file handling and development shall be done by a commercial laboratory.
- C. CITY ENGINEER shall have the right to select the subject matter and vantage point from which photographs are to be taken.
- D. Construction Progress Photos:
 1. Photographically demonstrate progress of construction, showing every aspect of site and adjacent properties as well as interior and exterior of new or impacted structures.
 2. Monthly: Take 24 exposures using 35 mm color film or digital photographs of comparable quality, unless otherwise approved by the CITY ENGINEER.
- E. Color Prints:
 1. Minimum Size: 3-inch by 5-inch.
 2. Finish: Glossy.
 3. Label Each Print:
 - a. Project Name.
 - b. Date and time photo was taken.
 - c. Photographer's name.
 - d. Caption (maximum 30 characters).
 - e. Location and area designation.
 - f. Schedule activity number, as appropriate.
 4. Assemble in bound albums in clear plastic sleeves that facilitate viewing both front and back of each photograph.
 5. Assemble negatives in their corresponding album in clear plastic sleeves made for the purpose or on recordable CD media organized by project segment.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.09 AUDIO-VIDEO RECORDINGS

- A. Prior to beginning Work on construction site or of a particular area of the Work, and again within 10 days following date of Substantial Completion, videograph construction site and property adjacent to construction site.
- B. In the case of preconstruction recording, no Work shall begin in the area prior to CITY ENGINEER's review and approval of content and quality of video for that area.
- C. Particular emphasis shall be directed to physical condition of existing vegetation, structures, and pavements within the construction site and areas adjacent to and within the right-of-way or easement, and on Contractor storage and staging areas.
- D. CITY ENGINEER shall have right to select subject matter and vantage point from which videos are to be taken.
- E. Video taping shall be by a professional commercial videographer, experienced in shooting construction videos.
- F. Video Format and Quality:
 - 1. DVD format, with sound.
 - 2. Video:
 - a. Produce bright, sharp, and clear images with accurate colors, free of distortion and other forms of picture imperfections.
 - b. Electronically, and accurately display the month, day, year, and time of day of the recording.
 - 3. Audio:
 - a. Audio documentation shall be done clearly, precisely, and at a moderate pace.
 - b. Indicate date, Project name, and a brief description of the location of taping, including:
 - 1) Facility name;
 - 2) Street names or easements;
 - 3) Addresses of private property; and
 - 4) Direction of coverage, including engineering stationing, if applicable.
- G. Documentation:
 - 1. Provide two copies to the Owner.
 - 2. DVD Label:
 - a. DVD number (numbered sequentially, beginning with 001).
 - b. Project Name.
 - c. Name of street(s) or easement(s) included.
 - d. Applicable location by engineering stationing.
 - e. Date and time of coverage.
 - 3. Project DVD Log: Maintain an ongoing log that incorporates above noted label information for DVD'S on Project.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

H. The Following Shall be Included with the Video Documentation:

1. Coverage is required within and adjacent to the construction site, the rights-of-way, easements, storage, and staging areas where the work is being constructed.
2. Documentation of the conditions of the adjacent properties or any affected structures as a result of the impending construction.
3. Certification as to date work done and by whom.
4. All videos shall be keyed to the construction drawings, provided with an index and a written narrative.

I. Preconstruction and Post-Construction Videos Shall be Submitted as follows:

1. Preconstruction videos shall be presented to the Owner at the preconstruction conference.
2. Post-construction videos shall be submitted prior to final project closeout. This submittal is contingent to final payment.

J. Payment for the work in this Section will be included as part of the lump sum price for mobilization/demobilization.

1.10 REFERENCE POINTS, SURVEYS, AND RECORD DRAWINGS

A. Location and elevation of benchmarks are shown on Drawings.

B. Contractor's Responsibilities:

1. Provide additional survey and layout required to layout the Work.
2. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
3. In event of discrepancy in data or benchmarks, request clarification before proceeding with Work.
4. Retain professional land surveyor or civil engineer registered in state of Florida who shall perform or supervise engineering surveying necessary for additional construction staking and layout.
5. Maintain complete accurate log of survey Work as it progresses as a Record Document. The Contractor is responsible for the quality control of horizontal location and vertical elevations of the installed project.
6. On request of CITY ENGINEER, submit documentation.
7. Provide competent employee(s), tools, stakes, and other equipment and materials as CITY ENGINEER may require to:
 - a. Establish control points, lines, and easement boundaries.
 - b. Check layout, survey, and measurement Work performed by others.
 - c. Measure quantities for payment purposes.
8. Contractor shall be responsible for performing survey and preparing "as-built" drawings for the pump station construction.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.01 CUTTING, FITTING, AND PATCHING**

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of Engineer before commencing Work to cut or otherwise alter:
 - 1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
 - 2. Weather- or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Work of others.
- C. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and Work is evident in finished surfaces.
- D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown.
- E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- G. Remove specimens of installed Work for testing when requested by CITY ENGINEER

END OF SECTION

COORDINATION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 01300 SUBMITTALS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by CONTRACTOR, that requires Engineer's approval.
- B. Informational Submittal: Information submitted by CONTRACTOR, that does not require the City of Fort Lauderdale Project Construction Manager's (PCM's) approval. Submittals not meeting conditions of the Contract will be returned.

1.02 PROCEDURES

- A. The CONTRACTOR shall prepare and submit select construction related correspondence, (transmittals, RFIs, proposals, etc.) to the PCM. During the preconstruction meeting, the CONTRACTOR shall be instructed by the PCM on the details for submitting correspondence for this Contract.
- B. Direct submittals to the PCM at the following address, unless specified otherwise:
 - 1. City of Fort Lauderdale, 100 N Andrews Avenue, 4th Floor – Engineering, Fort Lauderdale, FL 33301;
- C. Transmittal of submittal:
 - 1. The CONTRACTOR shall:
 - a. Review each submittal and check for compliance with the Contract Documents.
 - b. Stamp each submittal with the uniform approval stamp before submitting to the PCM.
 - 1) The stamp shall include the Project Name, submittal number, specification section number, CONTRACTOR's reviewer name, date of CONTRACTOR's approval, and a statement certifying that the submittal have been reviewed, checked and approved for compliance with the Contract Documents.
 - 2) The PCM will not review submittals that do not bear the CONTRACTOR's approval stamp and will return them without action.
 - 2. Complete, sign and transmit with each submittal package, one Transmittal of CONTRACTOR's Submittal form attached at the end of this section.
 - 3. Identify each submittal with the following:
 - a. Numbering and Tracking System:
 - 1) Sequentially number each submittal
 - 2) Resubmission of submittal shall have the original number with sequential alphabetic suffix.

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. Specification section and paragraph to which submittal applies.
 - c. Project title and CITY project number
 - d. Names of the CONTRACTOR, subcontractor or supplier, and manufacturer as appropriate.
 4. Identify and describe each deviation or variation from the Contract Documents.
- D. Format:
 1. Do not base Shop Drawings on reproductions of Contract Documents.
 2. Package submittal information by individual specification section. Do not combine different specification sections together in the submittal package unless otherwise directed to in the specifications.
 3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials and devices, and compliance with the Contract Documents.
 4. Index with labeled tab dividers in an orderly manner.
- E. Timeliness: Schedule and submit in accordance with schedule of shop drawing and sample submittals, and requirements of individual specification sections.
- F. Processing time:
 1. Time for review shall commence on the PCM's receipt of submittal.
 2. The PCM will act upon the CONTRACTOR's submittal and transmit the response to the CONTRACTOR no later than twenty-five (25) working days after receipt, unless otherwise specified.
 3. Resubmittals will be subject to the same review time.
 4. No adjustment of contract times or price will be allowed due to delays in the progress of the work caused by rejection and subsequent resubmittals.
- G. Resubmittals: Clearly identify each correction or change made.
- H. Incomplete submittals:
 1. The PCM will return the entire submittal for CONTRACTOR's revision if a preliminary review deems it incomplete.
 2. When any of the following are missing, submittal shall be deemed incomplete:
 - a. The CONTRACTOR's review stamp, completed and signed.
 - b. Transmittal of the CONTRACTOR's Submittal, completed and signed.
 - c. Insufficient number of copies.
- I. Submittals not required by the Contract Documents:
 1. Will not be reviewed and will be returned stamped, "Not Subject to Review."

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. The PCM will keep one copy and return all remaining copies to the CONTRACTOR.

1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual Specification sections.
- B. Shop Drawings:
 1. Copies: Six
 2. Identify and Indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on Drawings.
 - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
 3. Manufacturer's Standard Schematic Drawings and Diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
 4. Product Data: Provide as specified in individual Specification sections.
 5. Foreign Manufacturers: When proposed, include following additional information:
 - a. Names and addresses of at least two companies that maintain technical service representatives close to the Project.
 - b. Complete list of spare parts and accessories for each piece of equipment.
- C. Samples:
 1. Copies: 3, unless otherwise specified in individual Specification sections.
 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
 - a. Manufacturer name.
 - b. Model number.
 - c. Material.
 - d. Sample source.

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
 4. Full-size Samples:
 - a. Size as indicated in individual Specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.
- D. Action Submittal Dispositions: PCM will review, mark, stamp as appropriate and distribute marked up copies as noted:
1. Approved:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal.
 - b. Distribution:
 - 1) One copy retained by the PCM.
 - 2) One copy furnished to the City Inspector.
 - 3) One copy retained in City's Project file.
 - 4) Remaining copies returned to CONTRACTOR appropriately annotated.
 2. Approved as Noted:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - b. Distribution:
 - 1) One copy retained by the PCM.
 - 2) One copy furnished to the City Inspector.
 - 3) One copy retained in City's Project file.
 - 4) Remaining copies returned to CONTRACTOR appropriately annotated.
 3. Partial Approval, Resubmit as Noted:
 - a. Make corrections or obtain missing portions, and resubmit.
 - b. Except for portions indicated, CONTRACTOR may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - c. Distribution:
 - 1) One copy retained by the PCM.
 - 2) One copy furnished to the City Inspector.
 - 3) One copy retained in City's Project file.
 - 4) Remaining copies returned to CONTRACTOR appropriately annotated.
 4. Revise and Resubmit:

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Contractor may not incorporate product(s) or implement Work covered by submittal.
- b. Distribution:
 - 1) One copy retained by the PCM.
 - 2) One copy furnished to the City Inspector.
 - 3) One copy retained in City's Project file.
 - 4) Remaining copies returned to CONTRACTOR appropriately annotated.
5. Not Subject to Review: Information received is not required by the Contract.

1.04 INFORMATIONAL SUBMITTALS

A. General:

1. Copies: Submit 3 copies, unless otherwise indicated in individual Specification section.
2. Refer to individual Specification sections for specific submittal requirements.
3. The PCM will review each submittal. If submittal meets conditions of the Contract, The PCM will forward copies to appropriate parties. If the PCM determines that the submittal does not meet conditions of the Contract and is therefore considered unacceptable, the PCM will retain one copy and return remaining copies with review comments to the CONTRACTOR, and require that the submittal be corrected and resubmitted.

B. Application for Payment: In accordance with Section 01025, Measurement and Payment.

C. Certificates:

1. General:
 - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
2. Welding: In accordance with individual Specification sections.
3. Installer: Prepare written statements on manufacturer's letterhead certifying that installer complies with requirements as specified in individual Specification sections.
4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual Specification sections.

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

6. Manufacturer's Certificate of Compliance: In accordance with Section 01640, Manufacturers' Services.
7. Manufacturer's Certificate of Proper Installation: In accordance with Section 01640, Manufacturers' Services.
- D. Construction photographs and video: In accordance with Section 01040, Coordination, and as may otherwise be required in Contract Documents.
- E. Contract Closeout Submittals: In accordance with Section 01780, Contract Closeout.
- F. Contractor-Design Data:
 1. Written and graphic information.
 2. List of assumptions.
 3. List of performance and design criteria.
 4. Summary of loads or load diagram, if applicable.
 5. Calculations.
 6. List of applicable codes and regulations.
 7. Name and version of software.
 8. Information requested in individual Specification section.
- G. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification sections.
- H. Operation and Maintenance Data: As required in Section 01430, Operation and Maintenance Data.
- I. Schedules:
 1. Schedule of Shop Drawing and Sample Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01311, Construction Schedules.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.
 - 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
 - 3) Estimated date of submission to PCM including reviewing and processing time.
 - b. On a monthly basis, submit an updated schedule to the PCM if changes have occurred or resubmittals are required.
 2. Schedule of Values: In accordance with Section 01025, Measurement and Payment.
 3. Schedule of Estimated Progress Payments: In accordance with Section 01310, Progress Schedules.
 4. Progress Schedules: In accordance with Section 01310, Progress Schedules.

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- J. Special Guarantee: Supplier's written guarantee as required in individual Specification sections.
- K. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.
- L. Submittals Required by Laws, Regulations, and Governing Agencies:
 - 1. Submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 - 2. Transmit to PCM one copy of correspondence and transmittals (to include enclosures and attachments) between the CONTRACTOR and governing agency.
- M. Test and Inspection Reports:
 - 1. General: Shall contain signature of person responsible for test or report.
 - 2. Factory:
 - a. Identification of product and Specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Engineer.
 - f. Other items as identified in individual Specification sections.
 - 3. Field: As a minimum, include the following:
 - a. Project title and number.
 - b. Date and time.
 - c. Record of temperature and weather conditions.
 - d. Identification of product and Specification section.
 - e. Type and location of test, sample, or inspection, including referenced standard or code.
 - f. Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
 - g. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- h. Provide interpretation of test results, when requested by Engineer.
 - i. Other items as identified in individual Specification sections.
 - N. Testing and Startup Data: In accordance with Section 01810, Equipment Testing and Facility Startup.
 - O. Training Data: In accordance with Section 01640, Manufacturers' Services.
- 1.05 SUPPLEMENTS
 - A. The supplement listed below, following "END OF SECTION," is part of this Specification.
 - 1. Forms: Transmittal of CONTRACTOR's Submittal.
- 1.06 CONTRACTOR CORRESPONDENCE
 - A. The CONTRACTOR shall submit selected construction related correspondence. During the pre-construction meeting, the CONTRACTOR shall be instructed by the PCM (phone 954-828-5071) on the details of processing such documents for this Project.
 - B. The CONTRACTOR shall be required to track, at a minimum, the following documents:
 - 1. RFIs
 - 2. CCIRs
 - 3. Daily Reports
- 1.07 SUPPLEMENTS
 - A. The supplement listed below, following "END OF SECTION," is part of this specification.
 - 1. Forms: Transmittal of Contractor's Submittal.
- 1.08 PROGRESS PAYMENTS/REQUISITIONS FOR PAYMENT
 - A. The CONTRACTOR is responsible for creating the initial payment requisition. Each requisition shall be produced from updated progress data contained in the schedule and updated progress data. On a monthly basis, the CONTRACTOR shall meet with the PCM to discuss and agree on the progress of the work. Failure of the CONTRACTOR to maintain record documents and submit project schedule updates may result in a delay in processing monthly or final payment requisitions.
- PART 2 PRODUCTS (NOT USED)**
- PART 3 EXECUTION (NOT USED)**

END OF SECTION

SUBMITTALS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**Transmittal of Contractor's Submittal**

City of Fort Lauderdale

TO: City of Fort Lauderdale100 North Andrews Avenue4th Floor EngineeringFort Lauderdale, FL 33301Attn: Stan Edwards, Project Construction
Manager**FROM:** _____

Contractor

Submittal No.: _____

☐ New Submittal ☐ Resubmittal

Project: _____

Project No.: _____

Specification Section No.: _____

**(Cover only one section with each
transmittal)**

Schedule Date of Submittal:

SUBMITTAL TYPE: ☐ Shop Drawing☐ Sample☐ Informational**The following items are hereby submitted:**

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. and Para. No.	Drawing or Brochure Number	Contains Variation to Contract	
				No	Yes

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

The CONTRACTOR hereby certifies that (i) CONTRACTOR has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
CONTRACTOR (Authorized Signature)

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01311
CONSTRUCTION SCHEDULES****PART 1 -- GENERAL****1.1 SUBMITTALS**

- A. The CONTRACTOR shall provide a detailed Construction Schedule showing the CONTRACTOR's plan for completing the Work as required by the Contract Documents within the contract completion time. The format of the schedule shall be a bar chart (Gantt Chart). The schedule shall include the time from the date on the Notice to Proceed to the date for final completion. The date for final completion can be less than or equal to the date calculated from the contract time.
- B. The CONTRACTOR's Construction Schedule shall show activities including, but not limited to the following:
 - 1. Notice to Proceed
 - 2. Permits (Application preparation, submittal and review)
 - 3. Submittals, with review time
 - 4. Early procurement activities for long lead equipment and materials
 - 5. Mobilization summary
 - 6. Initial site work
 - 7. Specified Work sequences and construction constraints
 - 8. Major equipment design, fabrication, factory testing, and delivery dates
 - 9. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
 - 10. The work required by the contract and not covered in the previous items
 - 11. Shutdowns of CITY facilities
 - 12. Access restrictions to CITY facilities, roadways or private property
 - 13. System startup summary
 - 14. Contract Milestone and Completion Dates
 - 15. Substantial Completion
 - 16. Project closeout summary
 - 17. Demobilization summary
 - 18. Final Completion
- C. The CONTRACTOR shall show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by the CONTRACTOR.
- D. The procedure for approval of the Construction Schedule is as follows:
 - 1. The CONTRACTOR shall submit a Preliminary Construction Schedule within fourteen (14) days after Notice to Proceed.

CONSTRUCTION SCHEDULES**01311-1**

CAM 16-1224

EXHIBIT 4

Page 127 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. The CITY shall provide comments within ten (10) working days of receipt of the Preliminary Construction Schedule.
 3. The CONTRACTOR shall address the CITY's comments and submit the initial Construction Schedule within ten (10) working days after receiving CITY review comments.
 4. After the CITY accepts the initial Construction Schedule, it will be used to track the Work. The Construction Schedule will be submitted to CITY Management, residents and entities having jurisdiction in or near the project area, as appropriate.
 5. The CONTRACTOR shall provide for each Construction Schedule submission four (4) legible color copies, or one emailed copy in PDF.
 6. For unacceptable Construction Schedule Submittals the CONTRACTOR shall make requested corrections and resubmit within seven (7) days.
- E. The CONTRACTOR shall update the schedule periodically to depict the progress of the work. Updated schedules will be required:
1. For every progress meeting
 2. At the written request of the CITY
- The CONTRACTOR shall not change the completion time or other key durations in updated schedules without providing a written explanation to the CITY and obtaining written approval for the change from the CITY. The CONTRACTOR shall not provide an updated schedule showing a completion time greater than the contract time. Approved change orders are required to move the contract time, and the completion time shall not exceed the approved contract time. If it is absolutely necessary to show non approved adjustments to the completion time, non approved adjustments shall be shown as additional lines in the Gantt Chart below and separate from the approved progress schedule. In addition, the CONTRACTOR shall add the heading, "Non Approved Adjustments" above the lines added to the Gantt Chart. Despite being shown on the schedule, non approved adjustments shall not be construed to indicate approval of a change to the project completion time.
- F. If the CONTRACTOR fails to complete an activity by its latest scheduled completion date and this failure is anticipated to extend Contract Times (or Milestones), the CONTRACTOR shall, within seven (7) days of such failure, submit a written statement as to how the CONTRACTOR intends to correct nonperformance and return to acceptable current progress schedule. Actions by the CONTRACTOR to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.
- G. If the progress of the Work does not appear sufficient to complete the work within the contract time, the CONTRACTOR shall provide a recovery schedule at the request of the CITY. The recovery schedule shall show completion within the contract time and shall include descriptions of the changes the CONTRACTOR will make to meet the contract completion time.

CONSTRUCTION SCHEDULES

01311-2

CAM 16-1224

EXHIBIT 4

Page 128 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

APPROVED CONSTRUCTION SCHEDULE

- H. When accepted by the CITY, the initial Construction Schedule will replace the Preliminary Construction Schedule. Subsequent revisions will be considered as Updated Construction Schedules.

1.2 CONSTRUCTION SCHEDULE – FORMAT

- A. General: The Progress Schedule shall be a bar chart (Gantt Chart). Computer generated schedules are preferred, but hand drawn schedules are acceptable as long as the appearance is very similar for all submitted schedules and updates.
- B. The Construction Schedule and Updates shall:
1. Show days as the unit of measure
 2. Show all project-related activities reasonably required to complete the Work
 3. Show interdependence and sequence of construction
 4. Identify the Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
- C. For submittal of Construction Schedules and Updates, the CONTRACTOR shall:
1. Provide the schedule printed on paper not greater than 11 inches by 17 inches or smaller than 8 1/2 inches by 11 inches, unless otherwise approved. If necessary, the schedule shall be printed in color.

Include a title block on each page of the schedule showing the name of the Project, CITY, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate the current data date. If the schedule has more than one page, all pages shall be numbered.
 2. Identify horizontally across top of the schedule the timeframe by year, month, and day.
 3. Identify each activity with a descriptive title. If necessary, the CONTRACTOR shall add notes at the bottom of the schedule with brief descriptions of the Work associated with that activity.
 4. Indicate the critical path on the schedule.
 5. Provide notes below the bar chart schedule to describe any controlling relationships between activities.
 6. Plot activities on a time-scaled basis, with the length of each activity proportional to the current estimate of the duration.
 7. Provide a legend to describe standard and special symbols used.

CONSTRUCTION SCHEDULES

01311-3

CAM 16-1224

EXHIBIT 4

Page 129 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.3 CONSTRUCTION SCHEDULE UPDATES

- A. Updated Construction Schedules Shall Reflect:
 - 1. Progress of Work to within two (2) working days prior to submission
 - 2. Approved changes in Work scope and activities modified since the schedule or last update was accepted.
 - 3. Delays in Submittals or resubmittals, deliveries, or Work
 - 4. Adjusted or modified sequences of Work
 - 5. Other identifiable changes
 - 6. Revised projections of progress and completion
- B. The CONTRACTOR shall produce detailed sub-schedules during the Project, upon request of the CITY to further define critical portions of the Work such as facility shutdowns.
- C. The CONTRACTOR shall produce a highlighted 4-week Look Ahead Schedule for construction meetings as determined by the CITY, with schedule information compiled from the latest DETAILED PROGRESS SCHEDULE update.
- D. CITY may direct the CONTRACTOR to increase plant, equipment, labor force or working hours if CONTRACTOR fails to:
 - 1. Complete a Milestone activity by its completion date.
 - 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to CITY.

1.4 SCHEDULE ACCEPTANCE

- A. The CITY's Acceptance will demonstrate agreement that:
 - 1. The proposed schedule is accepted with respect to:
 - a. Contract Times, including Final Completion and all intermediate Milestones are within the specified times.
 - b. Specified Work sequences and constraints are shown as specified.
 - c. Specified CITY-furnished Equipment or Material arrival dates, or range of dates, are included.
 - d. Access restrictions are accurately reflected.
 - e. Start-up and testing times are as specified.
 - f. Submittal review times are as specified.
 - g. Startup testing duration is as specified and timing is acceptable

CONSTRUCTION SCHEDULES

01311-4

CAM 16-1224

EXHIBIT 4

Page 130 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. In all other respects, CITY's acceptance of the CONTRACTOR's schedule indicates that, in the CITY's judgment, the schedule represents a reasonable plan for constructing the Work in accordance with the Contract Documents. The CITY's review will not make any change in the Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not indicate acceptance of that change.
3. The Schedule remains the CONTRACTOR's responsibility and the CONTRACTOR retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct the Work in accordance with the Contract Documents.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

END OF SECTION

CONSTRUCTION SCHEDULES

01311-5

CAM 16-1224

EXHIBIT 4

Page 131 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01430
OPERATION AND MAINTENANCE DATA****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of project.
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data in data compilation format and on electronic media, as specified herein.
- B. Instructional Manual Format:
 - 1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - 2. Size: 8-1/2 inches by 11 inches, minimum.
 - 3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Project title.
- b. Designate applicable system, equipment, material, or finish.
- c. Identity of separate structure as applicable.
- d. Identity of equipment name, number and Specification section.
4. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
5. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
6. Paper: 20-pound minimum, white for typed pages.
7. Text: Manufacturer's printed data, or neatly typewritten.
8. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
9. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.
- C. Data Compilation Format:
 1. Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
 2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ____ OF ____," and list:
 - 1) Project title.
 - 2) Contractor's name, address, and telephone number.
 - 3) If entire volume covers equipment or system provided by one Supplier include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and Specification section.
 - c. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
 - d. Table of contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 2) Designate system or equipment for which it is intended.
 - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - e. Section Dividers:

OPERATION AND MAINTENANCE DATA

0143012
 0143012
 EXHIBIT 4
 Page 133 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- 1) Heavy, 80 pound cover weight tabbed with numbered plastic index tabs.
- 2) Fly-Leaf:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
 - b) List with Each Product:
 - (1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
- f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.

D. Electronic Media Format:

1. Operation and Maintenance Data Summary:
 - a. After all data has been found to be acceptable to Engineer, submit Operation and Maintenance summary data in electronic format on CD.
 - b. Data shall include the information included on the Maintenance Summary Forms and other summary information as defined by the Owner.
2. Electronic format shall be Microsoft Excel or similar as specified by the Owner.

1.05 SUBMITTALS

A. Informational:

1. Data Outline: Submit 2 copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data:
 - a. Submit 4 copies for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be forwarded to Resident Project Representative.
 - 3) One copy will be retained in Engineer's file.
 - 4) One copy will be retained by the PUBLIC WORKS DIRECTOR.
 - c. If data does not meet conditions of the Contract:
 - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.
 - 2) Engineer's comments will be retained in PUBLIC WORKS DIRECTOR's and Engineer's files.
 - 3) Resubmit 4 copies revised in accordance with Engineer's comments.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Final Data: Submit 3 copies in format specified herein.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content for Each Unit (or Common Units) and System:

1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - 1) Provide reinforced, punched, binder tab; bind in with text.
 - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - 4) Identify Specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. Control and flow diagrams.
 - d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for Owner's personnel, including:
 - a) Proper procedures in event of failure.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:
 - 1) Startup, break-in, routine, and normal operating instructions.
 - 2) Test procedures and results of factory tests where required.
 - 3) Regulation, control, stopping, and emergency instructions.
 - 4) Description of operation sequence by control manufacturer.
 - 5) Shutdown instructions for both short and extended duration.
 - 6) Summer and winter operating instructions, as applicable.
 - 7) Safety precautions.
 - 8) Special operating instructions.
 - d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 2) Guide to troubleshooting.
 - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
- 6. Guarantee, Bond, and Service Agreement: In accordance with Section 01780, Contract Closeout.

B. Content for Each Electric or Electronic Item or System:

- 1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including control and lighting systems.
- 2. Circuit Directories of Panelboards:
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
- 3. List of electrical relay settings, and control and alarm contact settings.
- 4. Electrical interconnection wiring diagram, including control and lighting systems.
- 5. As-installed control diagrams by control manufacturer.
- 6. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Safety precautions.
 - d. Special operating instructions.
- 7. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
- 8. Manufacturer's printed operating and maintenance instructions.

OPERATION AND MAINTENANCE DATA

0145015
 EXHIBIT 4
 Page 136 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

9. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
2. Format:
 - a. Use Maintenance Summary Form bound with this Section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

1.07 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:

1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENTS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. The supplements listed below, following "END OF SECTION," are part of this Specification.

1. Forms: Maintenance Summary Form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

OPERATION AND MAINTENANCE DATA

01430-7
CAN 16-1224
EXHIBIT 4
Page 138 of 663

PROJECT 11880

**CITY OF FORT LAUDERDALE WATER AND WASTEWATER CAPITAL
IMPROVEMENTS PROGRAM**

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a. Name _____ Telephone No. _____

b. Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

8. LUBRICANT LIST

9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

CAM 16-1224
EXHIBIT 4
Page 140 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS****PART 1 GENERAL****1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this Section:

1. American Association of Nurserymen: American Standards for Nursery Stock.
2. U.S. Weather Bureau, "Rainfall-Frequency Atlas of the U.S. for Durations From 30 Minutes to 24 Hours and Return Periods From 1 to 100 Years."
3. U.S. Department of Agriculture, "Urban Hydrology for Small Watersheds."
4. Federal Emergency Management Agency.
5. NFPA, National Fire Prevention Standard for Safeguarding Building Construction Operations.
6. Florida Department of Law Enforcement – Domestic Terrorism Task Force for Code Orange Conditions.

1.02 SUBMITTALS

A. Informational Submittals:

1. Copies of permits and approvals for construction as required by laws and regulations and governing agencies.
2. Temporary Utility Submittals: Dewatering well locations.
3. Temporary Construction Submittals:
 - a. Access Roads: Routes, cross-sections, and drainage facilities.
 - b. Parking area plans.
 - c. Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.
 - d. Fencing and protective barrier locations and details.
 - e. Engineer's field office plans.
 - f. Staging area location plan and permits as required.
 - g. Maintenance of Traffic (MOT) Plans: As specified herein, and proposed revisions thereto.
 - h. Plan for maintenance of existing sanitary sewer and potable water services and systems.

1.03 MOBILIZATION

A. Mobilization May Include, but Not be Limited To, These Principal Items:

1. Obtaining required permits.
2. Moving Contractor's field office and equipment required for operations onto site.
3. Installing temporary construction power, wiring, and lighting facilities.
4. Providing onsite communication facilities as required..

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
 6. Arranging for and erection of Contractor's work and storage yard.
 7. Posting OSHA required notices and establishing safety programs and procedures.
 8. Having Contractor's superintendent at site full time.
- B. Contractor is responsible for finding a suitable location for a project staging and material storage area, as required.
- C. Contractor is responsible for finding a suitable location for the project field office as well as the Engineer's field office if required by the project. Field offices may be stand alone facilities or suitable, existing commercial office space.

1.04 PERMITS

- A. Permits, Licenses, or Approvals: Obtain in accordance with the Owner's construction standards and Specifications and as otherwise required for completion of the Work.

1.05 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's project.
- B. Keep Owner informed of serious onsite accidents and related claims.

1.06 VEHICULAR TRAFFIC

- A. Maintenance of Traffic Plans (MOTs):
1. Adhere to MOTs reviewed and accepted by the PCM, and approved by the appropriate agency. Changes to this plan shall be made only by written approval of appropriate public authority and the PCM. Secure approvals for necessary changes so as not to delay progress of the Work.
 2. Traffic Routing: In MOT, show sequences of construction affecting use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.
- B. Preparation of MOTs: Contractor shall be prepare and submit MOTs where required by federal, state, county, or local agencies having jurisdiction. Contractor shall obtain all required approvals and permits associated with the MOTs.
1. Traffic control on all city, county, and state highway rights-of-way shall meet the requirements of the City of Fort Lauderdale, where applicable, and the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, as well as FDOT standard details for

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

01500-124
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- maintenance of traffic, in accordance with the Manual for Uniform Traffic Control and Safe Practices.
2. Traffic control on all county rights-of-way shall meet the additional requirements of the Broward County Engineering Department including but not limited to:
 - a. Notification of intent to commence construction activities in a county right of way shall be provided to the PUBLIC WORKS DIRECTOR no less than 10 business days prior to the start of construction.
 - b. The use of solid barriers to separate construction from adjacent traffic lanes where the difference in grade is greater than 12 inches.
 - c. Plating or backfilling of all nonprotected excavations at the close of each working day.
 - d. Broward County shall be named as an additional insured on Surety Bonds for any projects requiring work within County rights-of-way.
 3. Temporary traffic control on City streets shall utilize barrels in lieu of folding barricades. Contractor is to submit a sample or detail of proposed barrel to be used as part of the MOT submittal.
 4. Traffic control on all FDOT and Broward County highways shall include flagmen during all periods of active construction.
 5. Contractor shall submit copies of all MOT's to the PUBLIC WORKS DIRECTOR concurrent with submittal to the approving authority.
 6. Contractor shall submit three copies of the agency-approved MOT prior to initiation of construction or as required by specific permits contained herein.
 7. All MOTs shall be ATS certified.

1.07 PEDESTRIAN TRAFFIC

- A. The "MAINTENANCE OF TRAFFIC" Plan, provided by the Contractor, shall include provisions for pedestrian and transit vehicular traffic where applicable. The following are minimum requirements:
 1. The Contractor shall be responsible for providing a safe and adequate walking surface applicable to the Americans with Disabilities Act (ADA) for pedestrians. Safe walk routes for all pedestrians and transit users within the vicinity of the construction zone shall be maintained throughout construction. This includes safe walk routes/access to and from existing bus stops and transit vehicles. If the current walking surface and access to and from transit vehicles at bus stops can not be maintained, then a temporary road-rock 4-foot walk way shall be created. The safe walk route shall be separated from the construction activity by the 4-foot high orange construction fence for the entire length of the project or the length of the walk route, whichever is less.
 2. Pedestrian walkways, bus stops and pedestrian access to transit vehicles should be maintained free of any obstructions and hazards such as holes, debris, mud, construction equipment, stored materials, etc. Any hazards near or adjacent to walkways, bus stops and access to transit vehicles should be clearly delineated.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Where street closures do not allow access for scheduled garbage and refuse removal, the Contractor shall provide for moving residential containers to a suitable collection point on regular pick-up days.
4. Where safe pedestrian access/walkways can not be provided, pedestrians should be directed to alternative routes by appropriate traffic control devices. Pedestrian, bicycle, and wheelchair traffic shall be guided and maintained (special attention is directed to the existing bus stop location access) using approved warning lights, signing, and channelization devices. Such control devices shall be installed and maintained in accordance with the MUTCD sections on work zone traffic control for pedestrians and Chapter 6D. Pedestrian and Worker Safety.
5. Where construction activities involve consecutive bus stops, access to and from all bus stops should be maintained. If access to and from all bus stops can not be maintained, then a bus stop may be temporarily relocated or removed. However, no two consecutive bus stop shall be affected in this manner. If a stop requires temporary removal or relocation, then the Transit Superintendent at the Broward County Mass Transit Division, (954) 357-8381, should be notified 10 days prior to the occurrence so that appropriate notification can be completed by the Mass Transit Division.
6. It shall be the responsibility of the Contractor to install any necessary pavement, road rock, pavement marking and signage and/or any pedestrian signalization and/or signal modification to accommodate an existing or alternate walk route.
7. Thirty days prior to the beginning of construction the Contractor shall notify the Transit Superintendent at the Broward county Mass Transit Division, (954) 357-8381, to arrange a pre-construction - transit route/pedestrian access safety meeting. This meeting is to determine all bus routes affected and to make any necessary arrangements for rerouting and temporary signing.

PART 2 PRODUCTS

2.01 ENGINEER'S FIELD OFFICES.....deleted.....

PART 3 EXECUTION

3.01 ENGINEER'S FIELD OFFICE.....deleted.....

3.02 TEMPORARY UTILITIES

A. Power:

1. Electric power will be available at or near site. Determine type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay all costs for the electric power used during contract period, except for portions of the Work designated in writing by Engineer as substantially complete.
2. Cost of electric power used in performance and acceptance testing will be borne by Contractor.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

01500-124
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Lighting: Provide temporary lighting to meet all applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.
- C. Heating, Cooling, and Ventilating:
 - 1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage due to temperature or humidity.
 - 2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
 - 3. Pay all costs of installation, maintenance, operation, removal, and fuel consumed.
 - 4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
 - 5. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of utility company. Provide separate gas metering as required by utility.
- D. Water:
 - 1. Hydrant Water:
 - a. Is available from nearby hydrants. Secure written permission for connection, meter installation, and use from water department and meet requirements for use. Notify fire department before obtaining water from fire hydrants.
 - b. Use only special hydrant-operating wrenches to open hydrants. Make certain that hydrant valve is open full, since cracking the valve causes damage to the hydrant. Repair damaged hydrants and notify appropriate agency as quickly as possible. Hydrants shall be completely accessible to fire department at all times.
 - c. Include costs to connect and transport water to construction areas in Contract Price.
- E. Sanitary and Personnel Facilities: Provide and maintain facilities for Contractor's employees, Subcontractors, and all other onsite employer's employees. Service, clean, and maintain facilities and enclosures.
- F.deleted.....
- G. Fire Protection: Furnish and maintain on site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.03 PROTECTION OF WORK AND PROPERTY

A. General:

1. Perform Work within right-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
2. No residence or business shall be cut off from vehicular traffic for a period exceeding 2 hours, unless special arrangements have been made.
3. Maintain in continuous service all existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
4. Where completion of the Work requires temporary or permanent removal and/or relocation of existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
5. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
6. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
7. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
8. Notify property owners and utility offices that may be affected by construction operation at least 5 working days in advance.
 - a. All homes and businesses affected by construction activities shall be notified by use of a "doorhanger" type announcement describing at a minimum, the nature of the Work, the proposed schedule and the Contractor's contact information. An example doorhanger is provided as a supplement to this Section.
 - 1) The doorhangers shall be attached to the door, fence or other suitable location.
 - 2) The doorhanger shall be enclosed in an 8-½ -inch by 11-inch, weather resistant clear plastic bag with the notification information clearly visible from the outside.
 - b. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
9. Do not impair operation of existing utility systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, storm drains, pump stations, or other sewer structures.
10. Maintain original site drainage wherever possible.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Traffic Signal Communications Systems:

1. Maintain in continuous operation all existing traffic signal communication systems located within the Project limits for the duration of the Project. Maintenance of the traffic signal communication systems may entail the use of leased facilities, temporary splices, or the provision of alternate or replacement facilities as proposed by the Contractor and approved by the Broward County Traffic Engineering Division.
 - a. Online communication of existing or temporary signalization shall be maintained by interconnect cable or TELCO phone lines during construction.
 - b. A time based coordination (TBC) system may used only if either of the above is not feasible. TBC systems shall be developed by a traffic engineer registered in the State of Florida subject to County approval.
 - c. All reported malfunctions of traffic control systems shall be responded to by the Contractor within 2 hours and repaired within 24 hours.
2. In the event of a failure in the continuous operation of the traffic signal communication system, prepare a Remedial Action Plan that has been coordinated with the Broward County Traffic Engineering Division to determine the nature of the failure. The Remedial Action Plan shall be documented in a written report and submitted within one calendar day of the notification of the discontinuous operation of the traffic signal communication system.
3. Complete the implementation of the Remedial Action Plan within two calendar days upon receipt of approval of the Plan by the Broward County Traffic Engineering Division. Reworking of the Plan shall be required if the minimum system communication requirements are not met, as determined by the Broward County Traffic Engineering Division, as a result of a given Remedial Action Plan.
4. In the event that the traffic signal communication systems are damaged, a temporary splice to a damaged copper communications cable shall be accomplished by using approved splice material for connecting the bare wires. For damaged fiber optic communication systems, mechanical splicing of the fiber to achieve a maximum loss of 0.20 dB is acceptable. A junction box shall be installed over the splice on a temporary basis for access, unless a new cable is installed as per specifications.
5. Any material furnished and installed for the replacement of existing traffic communications infrastructure shall meet Broward County standards.
6. All traffic signal communication systems that were temporarily spliced shall be removed and replaced in kind with new cable, subject to approval by the Broward County Traffic Engineering Division, prior to final acceptance of the Project. Replacement shall be from junction box to junction box with no intermediate splices.

C. Site Security:

1. General – Code Yellow or Less:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. All Sites: Provide and maintain temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.
- b. Secure sites include, but are not limited to, water treatment plants, wastewater treatment plants, wellfields, water booster pump stations, storage facilities, and master lift stations.
- c. All employees shall have a company or City provided photo identification badge to be worn at all times while on a secure project site.
- d. Visitors shall be required to obtain daily visitor badges and vehicle access.
- e. Obtain approval in writing from the OWNER for work on secure sites outside of normal working hours. Approval must be available for inspection while working on the site after hours.
2. Code Orange Conditions for Work on Secure Sites:
 - a. The Contractor shall provide a list, to be updated weekly or whenever employees are added or removed, of all employees and subcontractor employees to be provided site access. Access for employees or visitors cannot be guaranteed and is subject to the discretion of security personnel.
 - b. All employees shall wear badges and sign-in daily.
 - c. The Contractor shall provide advance notice and coordinate with the OWNER for screening and delivery of all materials and supplies, including FedEx, US Postal Service, UPS, and all general delivery items.
 - 1) All packages for water treatment plant sites will be delivered through the central depot.
 - 2) All packages shall have the name of a Contractor's employee stationed at the jobsite.
 - 3) All delivery drivers shall have suitable photo identification and will be required to go through security procedures.
 - 4) No delay claims will be allowed for failure to obtain clearance for deliveries or to delays associated with the above processes.
3. Code Red Conditions:
 - a. Work on secure sites will be stopped for the duration of code red conditions. No access by Contractor or subcontractor personnel will be permitted until clearance has been granted by the Owner.
 - b. The Contractor will be compensated for standby delay under code red conditions as provided in Section 00826, SPECIAL CONDITIONS.

D. Barricades and Lights:

1. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of Contractor's employees, other employer's employees, and others who may be affected by the Work.
2. Provide to protect existing facilities and adjacent properties from potential damage.
3. Locate to enable access by facility operators and property owners.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

01500124
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
5. Locate barricades at the nearest intersecting public thoroughfare on each side of the blocked section.

E. Signs and Equipment:

1. Conform to requirements of manual published by the FDOT.
2. Barricades: Provide as required by the FDOT Vehicle Code and in sufficient quantity to safeguard public and Work.
3. Portable TOW-AWAY-NO STOPPING Signs: Place where approved by police department and Owner.
4. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.
5. High-Level Warning Flag Units: Provide two in advance of traffic approaching the Work, each displaying three flags mounted at a height of 9 feet.
6. ROAD CONSTRUCTION AHEAD Signs: Provide four, size 48 inches by 48 inches. Place in conspicuous locations, approximately 200 feet in advance of the Work, and facing approaching traffic.
7. DETOUR Signs: Provide two, right arrow or left arrow, placed as approved by the PCM.
8. RIGHT or LEFT LANE CLOSED AHEAD Signs: Provide two, place in advance of lane to be closed.
9. Provide at obstructions, such as material piles and equipment.
10. Illuminate barricades and obstructions with warning lights from sunset to sunrise.
11. Use to alert general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public access areas.
12. Submit proposed signage to the PCM for prior approval.

F. Existing Structures: Where Contractor contemplates removal of small structures such as mailboxes, signposts, and culverts that interfere with Contractor's operations, obtain approval of property owner and PUBLIC WORKS DIRECTOR. Replace those removed in a condition equal to or better than original.

G. Finished Construction: Protect finished floors and concrete floors exposed as well as those covered with composition tile or other applied surfacing.

H. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- I. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain foundations and parts of the Work free from water.

3.04 TEMPORARY CONTROLS

A. Air Pollution Control:

1. Minimize air pollution from construction operations.
2. Burning: Of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust as needed up to daily, as directed by the Owner. Strictly adhere to applicable environmental regulations for dust prevention.

B. Noise Control:

1. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
2. Noise Control Plan: Propose plan to mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments.

C. Water Pollution Control:

1. Divert sanitary sewage and nonstorm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to existing waterway.
2. Prior to commencing excavation and construction, obtain PUBLIC WORKS DIRECTOR'S agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.
3. Comply with procedures outlined in U.S. Environmental Protection Agency manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning," and "Implementation, Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity," and "Erosion and Sediment Control-Surface Mining in Eastern United States."
4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

- D. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases, and to protect

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

0150010
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

the Work and existing facilities from flooding during construction period. Meet all local, state, and Federal requirements and obtain necessary permits and approvals as required. Discharges to stormdrains, including discharge from dewatering systems, will not be permitted without the installation of a sediment removal system approved by the Owner.

1. The Contractor shall be responsible for maintaining all erosion and sediment control facilities to insure that they continue to function as intended and do not create a health or environmental hazard.
2. In the event of expected precipitation events, the Contractor shall remove all erosion or sediment barriers blocking City drains or inlets.
3. All sediment barriers installed on City drains and inlets shall be removed immediately upon installation of the final pavement and cleanup.

3.05 STORAGE YARDS AND BUILDINGS

- A. Coordinate requirements with Section 01600, Material and Equipment.
- B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- C. Temporary Storage Buildings:
 1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
 2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
 3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.
- D. Storage and staging facilities are permitted on private property subject to the review and approval of the Planning and Zoning Department and the issuance of a permit under the provisions of Section 47-19.2 of the Unified Land Development Regulations.
 1. Notice to Proceed will not be issued until the final approval is obtained.
 2. Staging area sign requirements are provided at the end of this Section.

3.06 ACCESS ROADS AND DETOURS

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits. Utilize existing roads where shown. Alignments for new routes must be approved by PUBLIC WORKS DIRECTOR or Owner.
- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

01500-11
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Coordinate with PUBLIC WORKS DIRECTOR detours and other operations affecting traffic and access. Provide at least 72 hours' notice to PUBLIC WORKS DIRECTOR of operations that will alter access to the site and adjacent private properties.
- F. Where access road crosses existing fences, install and maintain gates.
- G. Upon completion of construction, restore ground surface disturbed by access road construction to original grade. Replace damaged or broken culverts with new culvert pipe of same diameter and material.

3.07 PARKING AREAS

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.
- B. Provide parking facilities for personnel working on the Project. No employee or equipment parking will be permitted on Owner's existing paved areas, except as specifically designated for Contractor's use.

3.08 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. No public or private road shall be closed, except by written permission of proper authority. Assure the least possible obstruction to traffic and normal commercial pursuits.
- B. For Project Sections that Pass through a Broward County School Zone:
 - 1. No work is permitted in a school zone while school is in session.
 - 2. Contractor shall plan work accordingly – no delay time will be granted to comply with this requirement.
- C. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian:
 - 1. No two adjacent roadways can be under construction at the same time.
 - 2. At least 75 percent of all roadways shall have a maintained trench surface as described below at all times during the project.
 - 3. Construction in affected roadways shall be completed in sequence so that all improvements are completed, except for final pavement restoration during one continuous period. This includes water and sewer services to the edge of the right-of-way.
- D. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

01500-121
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. Road Closures: Maintain satisfactory means of exit for persons residing or having occasion to transact business along route of the Work. If it is necessary to close off roadway or alley providing sole vehicular access to property for periods greater than 2 hours, provide written notice to each owner so affected 3 days prior to such closure. In such cases, closings of up to 4 hours may be allowed. Closures of up to 10 hours may be allowed if a week's written notice is given and undue hardship does not result.
- F. Contractor shall submit MOT forms and/or applications as required by the agency with jurisdiction. The Temporary Modification of Traffic Form provided as a supplement to this Section shall be submitted to the PCM for all requested MOT's in accordance with the provisions of this Section. The form is required for MOT's in streets under City jurisdiction.
- G. Maintenance of traffic is not required if Contractor obtains written permission from Owner and tenant of private property, or from authority having jurisdiction over public property involved, to obstruct traffic at designated point.
- H. In making street crossings, do not block more than one-half the street at a time. Whenever possible, widen shoulder on opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.
- I. Maintain top of backfilled trenches, before they are paved, to allow normal vehicular traffic to pass over.
 - 1. Trench maintenance will consist of compacted sub-base with asphalt prime, temporary asphalt, or flowable fill as described in Section 02575, Surface Restoration.
 - 2. Provide temporary access driveways where required.
 - 3. Cleanup operations shall follow immediately behind backfilling.
 - 4. Watering of untreated backfill shall be utilized to control dust as directed by the Engineer until such time as adequate trench maintenance has been achieved.
- J. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.
- K. Notify fire department and police department before closing street or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without written permission from fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. Furnish Contractor's night emergency telephone numbers to police department.
- L. Move mailboxes to temporary locations accessible to postal service, and on completion of Work in each area, replace them in their original location and in a condition equal to or better than original.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- M. Remove or relocate barricades on designated trash collection days to allow access for trash pickup. If access is completely blocked, the Contractor shall move the affected trash containers to an accessible location and return them after pickup. Mark each container to ensure return to the proper location.
- N. Temporary Bridges:
 - 1. Construct temporary bridges at all points where maintenance of traffic across pipeline construction is necessary.
 - 2. Make bridges over public streets, roads, and highways acceptable to authority having jurisdiction thereover.
 - 3. Bridges erected over private roads and driveways shall be adequate for service to which they will be subjected.
 - 4. Provide substantial guardrails and suitably protected approaches.
 - 5. Provide foot bridges not less than 4 feet wide with handrails and uprights of dressed lumber.
 - 6. Maintain bridges in place as long as conditions of the Work require their use for safety of public, except that when necessary for proper prosecution of the Work in immediate vicinity of bridge. Bridge may be relocated or temporarily removed for such period as Engineer may permit.
- O. Detours: Where authority having jurisdiction requires that traffic be maintained over construction work in a public street, road, or highway, and traffic cannot be maintained on original roadbed or pavement, construct and maintain detour around the Work.
- P. Coordinate traffic routing with that of others working in same or adjacent areas.

3.09 CLEANUP PROCEDURES FOR HURRICANE WARNINGS AND WATCHES

- A. In the event that the National Oceanographic and Atmospheric Administration (NOAA) issues a hurricane watch for the Fort Lauderdale area, the PUBLIC WORKS DIRECTOR will contact the Contractor informing him that the watch has been established. Once notified of a hurricane watch, the Contractor will remove all unnecessary items from the work area and tie down all remaining supplies, barricades, and movable (under 200 pounds) objects. The PUBLIC WORKS DIRECTOR will determine "necessary" items. If a warning is issued, the Contractor shall complete the clean-up and evacuate the area the same day. The Owner shall not be liable for any costs or delays caused as a result of demobilization or remobilization due to the above.

3.10 CLEANING DURING CONSTRUCTION

- A. In accordance with General Conditions, as may be specified in Specification sections, and as required herein.
- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep all floors (basins, tunnels, platforms,

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

walkways, sidewalks, driveways, roof surfaces), and pick up all debris and dispose.

- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, dispose of such waste materials, debris, and rubbish offsite.
- D. Thoroughly clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation. Sidewalks, unless under construction, shall be kept clear of material, and available for pedestrian use at all times.

3.11 PROJECT SIGNS

- A. Provide two project signs, painted and mounted as shown on the Drawings and in the following section, at locations to be determined by the Owner or Engineer.
- B. Sign Dimensions:
 - 1. The project sign shall be dimensioned as shown on the Drawings.
 - 2. The staging area sign shall be limited to overall dimensions of 48 inches by 48 inches.

3.12 SUPPLEMENTS

- A. The supplements listed below, following "END OF SECTION," are part of this Specification.
 - 1. Supplement—1, Project Sign Detail, (2 required).
 - 2. Supplement—2, Staging Area Sign Detail.
 - 3. Supplement—3, Temporary Modification of Traffic (MOT) Routing Form.
 - 4. Supplement—4, Door Hanger Notification Template.

END OF SECTION



City of Fort Lauderdale

Public Works

Department Utilities

Engineering Division

**Project Name: Sanitary Sewer Pump Station A-12
Rehabilitation**

Project No: 11880

Project Cost:

Contractor:

Engineer:

Start Date:

Planned Completion Date:

Customer Service: 954/828-8000

CITY COMMISSION

John P. "Jack" Seiler – Mayor

Bruce G. Roberts – District I

Dean J. Trantalis – District II

Bobby B. DuBose – District III

Romney Rogers – District IV

City Manager–Lee R. Feldman, ICMA-C





City of Fort Lauderdale Infrastructure Rehabilitation Program

Project Name: Sanitary Sewer Pump Station A-12 Rehabilitation, #11880

Planned Completion Date: _____

Contractor: _____

24-Hour Emergency Contact: _____

City Public Works Department Customer Service Office 954-828-8000

TEMPORARY MODIFICATION OF TRAFFIC (MOT) ROUTING FORM

DATE:

APPLICANT/ADDRESS/PHONE:

PERMIT NO. _____

(PROVIDED BY CITY AT TIME OF PERMIT APPLICATION)

PROJECT NAME/ADDRESS: _____

- This routing form should be completed and submitted as an attachment to the above-referenced permit (hereinafter "PERMIT").
- Obtaining signatures on this routing form does not constitute any approvals by the City. The MOT may be implemented only after issuance of the PERMIT, subject to satisfaction of all prerequisite conditions.
- This form is for MOT's within rights-of-way under City of Fort Lauderdale's jurisdiction. If the MOT or detour routes affect rights-of-way under Broward County jurisdiction, the County's form (available on the City website) should also be completed with the required signatures and attached. If the detours affect FDOT right-of-way, a permit from FDOT must be attached.
- If work is taking place in County or FDOT R/W, an MOT permit is not required from the City. However, PERMIT applicant (hereinafter APPLICANT) is asked to provide two weeks advance notice of any closures or detours to the City's Public Information Office.

Specific dates and times requested for MOT implementation:

Begin _____ End _____

Describe Work, including location of site and address, names of affected streets, why MOT is necessary, nature of the construction, deliveries, staging areas, if cranes will be used, etc. (staging and storage of materials/equipment are not permitted in the right-of-way). Please note if additional sheets have been attached for the description of work.

Describe MOT, the number of lanes affected on each street, if metered parking spaces will be displaced, if detours are necessary, if flagmen will be provided, if MOT will be full-time (or times of day the MOT is to be in effect) and any other special considerations related to this request. Please note if additional sheets have been attached for the description of MOT.

Attach: MOT plan prepared by a certified worksite traffic control technician or traffic control supervisor (as appropriate for the complexity of the job), with a copy of current certification.

If implementation of an approved PERMIT is found to adversely affect public safety and/or public convenience or there is a conflict with a higher public purpose, the APPLICANT may be required to modify the MOT plan or the PERMIT may be temporarily suspended or permanently revoked at any time with reasonable notice from the City.

The MOT plan shall be in accordance with provisions of the latest edition of Part IV of the Manual of Uniform Traffic Control Devices for Streets and Highways and FDOT Design Standards. Compliance with the requirements of the approved plan shall be the responsibility of the APPLICANT.

(APPLICANT)_____
(Print Name/Title)

As a consideration for the permission granted herein, _____ (APPLICANT) agrees to indemnify and hold harmless the City of Fort Lauderdale for any damages, claims or injuries that may result from the MOT plan approved under the PERMIT.

(Name of Company)By: _____
(Company Officer, President, or Authorized Agent)

Project Name: _____ **PERMIT NUMBER:** _____

Applicant should collect the signatures in this section (if required). To expedite processing, signatures may be requested concurrently via fax or pdf and provided on separate copies of this page.

(Date)

Police Department (Patrol Secretary Office)

(Required only if MOT includes a detour for any direction of travel)
1300 West Broward Boulevard
Tel.: (954) 828-5477 (call for appointment)

(Date)

Fire-Rescue Department

(Required only if MOT includes a detour for any direction of travel)
Bill Findland, Assistant Chief
528 NW 2nd Street
Tel.: (954) 828-4351 (call for appointment); Fax: (954) 828-6843

(Date)

Maj Shakib/ Studies Section

(Required only if MOT/detour affects County road or intersection)
2300 W. Commercial Boulevard
(Please call (954) 847-2655 for appt. Walk-ins NOT accepted)

After above signatures are collected, Applicant should forward the MOT Plan and this routing form to the person listed below.

(Date)

Transportation and Mobility

Heslop Daley, Project Engineer
290 NE 3rd Avenue
Tel: (954) 828-5734 Fax: (954) 828-3734

City Manager's signature to be requested by City Staff only (if signature is required)

(Date)

City Manager's Office

Lee R. Feldman, ICMA-CM, City Manager
100 N. Andrews Avenue, 7th Floor
Tel.: (954) 828-5013 or Fax: (954) 828-5121

A copy of the PERMIT, this routing form and MOT shall be kept on-site and made available to the City inspector at all times.

This form is for MOT plans associated with private utility projects and private development projects. MOT plans for City Capital Improvement Projects shall be coordinated through Engineering Inspection or the Project Manager. Traffic modifications required for special events shall be arranged through the City's Special Events Coordinator, Jeff Meehan at (954) 828-6705.

[CONTRACTOR'S NAME]
[CONTRACTOR'S STREET ADDRESS]
[CONTRACTOR'S CITY, STATE AND ZIP]
[CONTRACTOR'S TELEPHONE NUMBER]
[CONTRACTOR'S FAX NUMBER]

MEMORANDUM

TO: RESIDENTS OF [LOCATION OF CONSTRUCTION]
DATE: [CURRENT DATE]
RE: CONSTRUCTION IN YOUR AREA
FROM: [CONTRACTOR'S NAME]

Construction in your area will commence on [date of construction commencement].

The construction area is from [boundary #1] to [boundary #2].

Access to the area will be limited at certain times due to the construction activities. We apologize for any inconvenience and we will do our best to accommodate access to residents.

Thank You,

[Contractor Name]



ORDINANCE NO. C-02-

AN ORDINANCE AMENDING THE UNIFIED LAND DEVELOPMENT REGULATIONS OF THE CITY OF FORT LAUDERDALE, FLORIDA, AMENDING SECTION 47-19.2, ACCESSORY BUILDINGS AND STRUCTURES, GENERAL, TO ADD A NEW SUBSECTION ENTITLED "CONSTRUCTION STAGING AREAS" TO PERMIT PROPERTY TO BE USED AS A STAGING AREA IN CONNECTION WITH PUBLIC CONSTRUCTION PROJECTS AS A TEMPORARY USE IN ANY ZONING DISTRICT AND PROVIDING REQUIREMENTS AND A PROCESS FOR REVIEW, APPROVAL AND TERMINATION OF APPROVAL.

BE IT ORDAINED BY THE CITY COMMISSION OF THE CITY OF FORT LAUDERDALE, FLORIDA:

SECTION 1. That Section 47-19.2, Accessory buildings and structures, general, of the Unified Land Development Regulations (hereinafter referred to as "ULDR") of the City of Fort Lauderdale, Florida, is hereby amended to add a new subsection FF as follows:

Sec. 47-19.2. Accessory buildings and structures, general

FF. Construction staging areas. The staging of public purpose construction projects including but not limited to the construction of public rights-of-way, utilities and facilities, may be permitted in all zoning districts as a temporary use, in order to allow for the safe, efficient completion of the project with minimal disruption to existing residents, businesses, and traffic, and to ensure that public services and facilities are available. Construction staging materials shall include the parking and placing and storing of construction materials, vehicles, equipment and support facilities required for the construction of a public project. Construction staging areas shall be permitted subject to the following review processes and conditions:

1. Application. An application shall, in addition to the requirements provided in Section 47-24,

ORDINANCE NO. C-02-

PAGE 2

Development Permits and Procedures, include the following:

- a. A description and sketch dimensioned to scale of the proposed use of the subject property as a construction staging area, including such information as the location and type of construction materials, equipment, support facilities, vehicles, trailers or other construction equipment, storage areas for materials, traffic circulation plan to and from the site, access to the site, location, type of materials and details of any required sign and fencing.
- b. A sketch of the proposed site signage, including all contact information; and the proposed location of the sign.
- c. The time required to complete the public construction project.
- d. A statement signed by the property owner stating that the property owner shall consent to the temporary use of the property for construction staging as provided in the temporary construction permit application and acknowledging that the property owner shall be held responsible for the removal of construction staging materials and debris if the applicant fails to do so upon termination of the temporary public purpose construction staging permit.

2. Standards.

- a. A fence of a material, design, and construction that meets Building Code requirements and precludes visibility through the fence, shall be erected around the

ORDINANCE NO. C-02-

PAGE 3

- perimeter of the site. The fence shall have a minimum height of 6.5 feet and a maximum height of 10 feet; such height to be determined as part of the Site Plan Level I permit based on what height is necessary to protect adjacent properties.
- b. The site shall be posted with a sign 16 square feet in size adjacent to the street, clearly visible from the right-of-way identifying the project by name, the name of the contractor, and the engineer responsible for construction management, and shall provide 24-hour phone contact information.
- c. Movement of vehicles, storage materials or other activities at the site shall be limited to the hours of 7:30 A.M. to 5:30 P.M. Monday through Friday, unless otherwise specifically approved as provided in the Site Plan Level I permit.
- d. Construction staging areas at the site shall be limited to the activities approved as part of the Site Plan Level I permit and no other activities shall be permitted except as approved by amendment of the Site Plan Level I permit.
- e. Conditions of approval may be imposed if necessary to mitigate the impact on adjacent property such as temporary paving, landscaping, and watering, all in accordance with engineering standards.
- f. A termination date for the temporary construction permit shall be established by the department based on the information provided by the applicant, but an extension of such termination date may be granted if good

ORDINANCE NO. C-02-

PAGE 4

cause is shown by filing an amendment to the Site Plan Level I permit.

3. Review process.

- a. Approval of a Site Plan Level I permit as described in Section 47-24.2.
- b. In addition to the review process applicable to a Site Plan Level I permit, the application shall be forwarded to and reviewed by the City's Public Services Department and the Property and Right-of-way Committee.

A recommendation from both entities shall be forwarded to the department and included as part of the review of the Site Plan Level I application.

4. Review Criteria. In addition to the review criteria for a Site Plan Level I permit, the following shall apply:

- a. The proposed plan meets the standards provided in this Section 47-19.2; and
- b. The plan includes measures to insure there is minimal disruption to existing residents, businesses and traffic in the area.

5. Effective date of approval. The approval of a temporary construction staging area application by the department shall not take effect nor shall a permit be issued any sooner than thirty (30) days after approval and then only if no motion is adopted by the city commission seeking to review the application or no appeal is filed as provided in Section 47-26B, Appeals.

6. Appeal. If a temporary construction staging permit is denied or is approved with conditions

ORDINANCE NO. C-02-

PAGE 5

unacceptable to the applicant, the applicant may appeal the decision in accordance with the procedures provided in Section 47-26B., Appeals.

7. If, during the course of the construction of the public purpose construction project it is found that activities on the construction staging area site are detrimental to the health, safety and welfare of the public as determined by the City Engineer, the applicant shall be given notice of additional measures that must be taken in order to mitigate the negative impact. If the applicant fails to institute such measures within five (5) calendar days of notice, notice shall be given of a hearing to be held before the City Commission and applicant shall be required to address the impacts associated with the staging area site. If the applicant fails to demonstrate how the negative impacts will be mitigated or fails to institute the measures within the time required by the City Commission, the City Commission may terminate the permit.
8. Termination of permit. The temporary construction staging permit shall terminate on the date established by the department or the City Commission as provided in this subsection FF. Upon termination of a temporary construction staging permit the site applicant or property owner shall have thirty (30) days from termination to restore the site to a clean and safe condition with all construction staging materials and debris removed.

SECTION 2. That Table 1 of Section 47-24, Development Permits and Procedures, is hereby amended to add "public project construction staging area" as a Site Plan Level I review, as shown on the Exhibit attached hereto and made a part hereof.

ORDINANCE NO. C-02-

PAGE 6

SECTION 3. That if any clause, section or other part of this Ordinance shall be held invalid or unconstitutional by any court of competent jurisdiction, the remainder of this Ordinance shall not be affected thereby, but shall remain in full force and effect.

SECTION 4. That all ordinances or parts of ordinances in conflict herewith, be and the same are hereby repealed.

SECTION 5. That this Ordinance shall be in full force and effect ten days from the date of final passage.

PASSED FIRST READING this the _____ day of _____, 2002.
PASSED SECOND READING this the _____ day of _____, 2002

Mayor
JIM NAUGLE

ATTEST

City Clerk
LUCY MASLIAH

L:\COMM2002\ORD\JUNE4\STAGING.WPD

Chart 3

SECTION 47-24. DEVELOPMENT PERMITS AND PROCEDURES

TABLE 1. DEVELOPMENT PERMITS AND PROCEDURES

Permit	Department	Development Review Committee	Planning & Zoning Board (Local Planning Agency)	Historic Preservation Board	City Commission	Board of Adjustment	Criteria for Review
CENTRAL BEACH AREA DISTRICTS - see Section 47-12 and other regulations provided in this Table 1.	-	-	-	-	-	-	1. Adequacy Review Sec. 47-25.2 2. Neighborhood Compatibility Review Sec. 47-25.3
SITE PLAN-LEVEL I DEPARTMENT							
1. Sidewalk cafe	DP		A		CRR/PZ		1. Adequacy Review Sec. 47-25.2 2. Outdoor Uses, Sidewalk Cafe Sec. 47-19.9
2. Mobile vendor	DP		A		CRR/PZ		1. Adequacy Review Sec. 47-25.2 2. Mobile Vendor, Sec. 47-18.22
3. Residential—less than 5 units	DP		A		CRR/PZ		Adequacy Review Sec. 47-25.2
4. New nonresidential construction—5,000 square feet or less	DP		A		CRR/PZ		Adequacy Review Sec. 47-25.2
5. Modification of waterway lot widths in RS-4.4 & RS-8 Districts	DP		A		CRR/PZ		1. Adequacy Review Sec. 47-25.2 2. Modification of Lot Width, Sec. 47-23.10
6. Change of use—different operation but does not involve development which requires a Site Plan Level II or higher permit—See Sec. 47-3.5.B.a	DP		A		CRR/PZ or Dept.		Nonconforming Uses, Section 47-3

7. Reuse of nonconforming structure	DP		A		CRR/PZ or Dept.		1. Adequacy Review Sec. 47-25.2, and 2. Neighborhood Compatibility Review Sec. 47-25.3 3. Nonconforming Uses, Section 47-3
8. Continuation of nonconforming status	DP		A		CRR/PZ or Dept.		Nonconforming Uses, Section 47-3
9. Approval of off-site parking	DP		A		CRR/PZ or Dept.		Parking and Loading Sec. 47-20.18
10. Temporary Construction Staging	DP				A		Section 47-19.2.FF.
...							
SITE PLAN-LEVEL II DEVELOPMENT REVIEW COMMITTEE							

L:\COMM2002\ORDJUNE4\chart3.doc

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 01540**DEMOLITION AND REMOVAL OF EXISTING STRUCTURES AND EQUIPMENT****PART 1 -- GENERAL****1.1 THE REQUIREMENT**

- A. This Section covers the demolition, removal, and disposal of existing buildings, structures, pavement, curbs, and sidewalk, removal and disposal of asbestos materials, and any existing equipment including electrical, plumbing, heating and ventilating equipment and piping not required for the operation of the rehabilitated plant as indicated on the Drawings and as specified hereinafter. The CONTRACTOR shall furnish all labor, materials and equipment to demolish buildings and structures and to remove fixtures, anchors, supports, piping and accessories designated to be removed on the Drawings.
- B. The CONTRACTOR shall demolish and remove the existing pump and any existing structure, piping, conduits, electrical equipment, mechanical equipment, or appurtenances or portions thereof, as shown on the Drawings or required to complete the project.
- C. The disposal of all removed items shall be in accordance with all Federal, State and local laws including but not limited to RCRA, Toxic Substance Control Act (TSCA), Hazardous Materials Transportation Act (HMTA), USEPA and the Florida Department of Environmental Protection Solids and Hazardous Waste Section regulations in effect as of the bid date.

1.2 TITLE TO EQUIPMENT AND MATERIALS

- A. CONTRACTOR shall have no right or title to any of the equipment, materials or other items to be removed from the existing buildings or structures unless and until said equipment, materials and other items have been removed from the premises. The CONTRACTOR shall not sell or assign, or attempt to sell or assign any interest in the said equipment, materials or other items until the said equipment, materials or other items have been removed.
- B. CONTRACTOR shall have no claim against the OWNER because of the absence of such fixtures and materials.

1.3 CONDITION OF STRUCTURES AND EQUIPMENT

- A. The OWNER does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.
- B. Conditions existing at the time of inspection for bidding purposes will be maintained by the OWNER so far as practicable.
- C. The information regarding the existing structures and equipment shown on the Drawings is based on visual inspection and a walk-through survey only. Neither the ENGINEER nor the OWNER will be responsible for interpretations or conclusions drawn therefrom by the CONTRACTOR.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 2 – PRODUCTS (NOT USED)**PART 3 -- EXECUTION****3.1 DEMOLITION AND REMOVALS**

- A. The removal of all equipment and piping, and all materials from the demolition of structure shall, when released by the OWNER and ENGINEER, shall be done by the CONTRACTOR and shall become the CONTRACTOR's property, unless otherwise noted, for disposition in any manner not contrary to the Contract requirements and shall be removed from the site to the CONTRACTOR's own place of disposal.
- B. The Electrical Contractor (Subcontractor) specifically, shall de-energize all panelboards, lighting fixtures, switches, circuit breakers, electrical conduits, motors, limit switches, pressure switches, instrumentation such as flow, level and/or other meters, wiring, and similar power equipments prior to removal. Any electric panels or equipment which are to be retained shall be relocated or isolated by the Electrical Contractor (Subcontractor) specifically, prior to the removal of the equipment specified herein.
- C. The CONTRACTOR shall proceed with the removal of the equipment, piping and appurtenances in a sequence designed to maintain the plant in continuous operation as described in Section 01520, Maintenance of Utility Operations During Construction, and shall proceed only after approval of the ENGINEER.
- D. Any equipment piping and appurtenances removed without proper authorization, which are necessary for the operation of the existing facilities shall be replaced to the satisfaction of the ENGINEER at no cost to the OWNER.
- E. Excavation caused by demolitions shall be backfilled with fill free from rubbish and debris.

3.2 PROTECTION

- A. Demolition and removal work shall be performed by competent experienced workmen for the various type of demolition and removal work and shall be carried out through to completion with due regard to the safety of OWNER employees, workmen on-site and the public. The work shall be performed with as little nuisance as possible.
- B. The work shall comply with the applicable provisions and recommendation of ANSI A10.2, Safety Code for Building Construction, all governing codes, and as hereinafter specified.
- C. The CONTRACTOR shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. The CONTRACTOR shall give particular attention to shoring and bracing requirements so as to prevent any damage to new or existing construction.
- D. The CONTRACTOR shall provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, workmen engaged in demolition operations, and adjacent construction.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. The CONTRACTOR shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.
- F. The CONTRACTOR shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and new work is being done, connections made, materials handled or equipment moved.
- G. The CONTRACTOR shall take necessary precautions to prevent dust from rising by wetting demolished masonry, concrete, plaster and similar debris. Unaltered portions of the existing buildings affected by the operations under this Section shall be protected by dust-proof partitions and other adequate means.
- H. The CONTRACTOR shall provide adequate fire protection in accordance with local Fire Department requirements.
- I. The CONTRACTOR shall not close or obstruct walkways, passageways, or stairways and shall not store or place materials in passageways, stairs or other means of egress. The CONTRACTOR shall conduct operations with minimum traffic interference.
- J. The CONTRACTOR shall be responsible for any damage to the existing structure or contents by reason of the insufficiency of protection provided.

3.3 WORKMANSHIP

- A. The demolition and removal work shall be performed as described in the Contract Documents. The work required shall be done with care, and shall include all required shoring, bracing, etc. The CONTRACTOR shall be responsible for any damage which may be caused by demolition and removal work to any part or parts of existing structures or items designated for reuse or to remain. The CONTRACTOR shall perform patching, restoration and new work in accordance with applicable Technical Sections of the Specifications and in accordance with the details shown on the Drawings. Prior to starting of work, the CONTRACTOR shall provide a detailed description of methods and equipment to be used for each operation and the sequence thereof for review by the ENGINEER.
- B. All supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts and other supports shall be removed to approximately 1-inch below the surrounding finished area and the recesses shall be patched to match the adjacent areas. Superstructure wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, as specified under applicable Sections of these Specifications, as shown on the Drawings, or as directed by the ENGINEER. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the appropriate Sections of these Specifications, as shown on the Drawings, and as directed and approved by the ENGINEER.
- C. Materials or items designated to remain the property of the OWNER shall be as hereinafter tabulated. Such items shall be removed with care and stored at a location at the site to be designated by the OWNER.
- D. Where equipment is shown or specified to be removed and relocated, the CONTRACTOR shall not proceed with removal of this equipment without specific prior approval of the

DEMOLITION AND REMOVAL OF EXISTING STRUCTURES AND EQUIPMENT

CM 54-024
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ENGINEER. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the CONTRACTOR, OWNER and ENGINEER. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation and protected and stored until required. Material or items damaged during removal shall be replaced with similar new material or item. Any equipment that is removed without proper authorization and is required for plant operation shall be replaced at no cost to the OWNER.

- E. Wherever piping is to be removed for disposition, the piping shall be drained by the CONTRACTOR and adjacent pipe and headers that are to remain in service shall be blanked off or plugged and then anchored in an approved manner.
- F. Materials or items demolished and not designated to become the property of the OWNER or to be reinstalled shall become the property of the CONTRACTOR and shall be removed from the property and legally disposed of.
- G. The CONTRACTOR shall execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.
- H. In general, masonry shall be demolished in small sections, and where necessary to prevent collapse of any construction, the CONTRACTOR shall install temporary shores, struts, and bracing.
- I. Where alterations occur, or new and old work join, the CONTRACTOR shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations, unless otherwise shown on the Drawing or specified, shall comply with that of the various respective trades which normally perform the particular items or work.
- J. The CONTRACTOR shall finish adjacent existing surfaces to new work to match the specified finish for new work. The CONTRACTOR shall clean existing surfaces of dirt, grease, loose paint, etc., before refinishing.
- K. The CONTRACTOR shall cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.
- L. The CONTRACTOR shall confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the new work. The CONTRACTOR shall cut and remove insulation, etc., and provide temporary weather tight protection as required until new roofing and flashings are installed.
- M. The CONTRACTOR shall remove temporary work, such as enclosures, signs, guards, and the like when such temporary work is no longer required or when directed at the completion of the work.

3.4 MAINTENANCE

- A. The CONTRACTOR shall maintain the buildings, structures, and public properties free from accumulations of waste, debris, and rubbish, caused by the demolition and removal operations.

DEMOLITION AND REMOVAL OF EXISTING STRUCTURES AND EQUIPMENT

CM 54-024
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. The CONTRACTOR shall provide on-site dump containers for collection of waste materials, debris and rubbish, and he shall wet down dry materials to lay down and prevent blowing dust.
- C. At reasonable intervals during the progress of the demolition and removal work or as directed by the ENGINEER, the CONTRACTOR shall clean the site and properties, and dispose of waste materials, debris and rubbish.

3.5 EQUIPMENT AND MATERIALS RETAINED BY OWNER

- 1. Control panels and electrical equipment and appurtenances
- 2. Pumps, valves and motors

Deliver to City's CMS Building.

3.6 JOB CONDITIONS

- A. The CONTRACTOR shall execute the demolition and removal work to prevent damage or injury to structures, occupants thereof, and adjacent features, which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.
- B. Closing or obstructing of roadways adjacent to the work by the placement or storage of materials will not be permitted. All operations shall be conducted with a minimum interference to traffic on these ways. The CONTRACTOR shall provide temporary rock driveways or access roads as may be required to maintain access by all property owners to their property.
- C. The CONTRACTOR shall repair damage done to facilities to remain, or to any property belonging to the OWNER.
- D. The CONTRACTOR shall carry out his operations so as to avoid interference with operations and work in the existing facilities.
- E. At least 48 hours prior to commencement of a demolition or removal, the CONTRACTOR shall notify the ENGINEER in writing of his proposed schedule therefor. No removals shall be started until it is acceptable to the ENGINEER. CONTRACTOR shall notify all property owners affected by the demolition work at least 48 hours prior to the start of any demolition activities.
- F. The CONTRACTOR shall comply with and have documented Confined Space Entry Space Procedures available at the project at all times as required by OSHA 29 CFR 1910.146. The CONTRACTOR shall also comply with any state and/or local requirements if more restrictive than the federal requirements.
- G. The CONTRACTOR shall comply with safe working practices for abrasive blasting, cleaning, burning, welding, and handling lead based and non-lead based coated steel and all health and safety regulations and requirements of Federal OSHA 29 CFR 1926.62, Interim Final Rule on Lead in Construction, state and local health regulatory agencies, Material Safety Data Sheets (MSDS), and the paint and abrasive manufacturers. This requirement shall be accomplished without supervision from the OWNER. The CONTRACTOR shall provide portable sanitary toilet and wash-up facilities at the work site.

DEMOLITION AND REMOVAL OF EXISTING STRUCTURES AND EQUIPMENT

CM 54-024
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- H. The CONTRACTOR shall comply with all local, state, and federal regulations concerning emissions or disposal of solid, particulate, liquid, or gaseous matter as a result of the demolition operations. This compliance shall be accomplished without supervision from the OWNER. No additional compensations for changes in the laws, regulations, or the interpretation thereof shall be granted by the OWNER. No burning of trash on the site shall be permitted. Any fines imposed on the OWNER by any regulatory agency as a result of the CONTRACTOR's non-compliance with environmental regulations shall be paid or reimbursed by the CONTRACTOR.
- I. Welding or Cutting Operations: Provide adequate worker protection in accordance with the instructions in ANSI Z49.1, "Safety in Welding and Cutting" and in OSHA 29 CFR 1926.62, Interim Final Rule on lead in construction.
- J. Explosives shall not be used in the execution of this Contract.

3.7 DUST CONTROL

- A. The CONTRACTOR shall use temporary enclosures and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Existing electrical and mechanical equipment to remain shall be protected from damage, dust, and debris.

3.8 PAINT CONTAINING LEAD

- A. The CONTRACTOR shall comply with all Federal, State, and local regulations regarding the handling and disposal of paint containing lead.

- END OF SECTION -

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 01590 – PROJECT SIGN**PART 1 GENERAL**

Contractor, at contractor's expense, shall furnish and install a **4' x 8'** sign (with white painted posts) prior to start of construction. A sample sign template is below but is not specific to the project. The exact style and design of the sign will be provided by the CITY to the Contractor during the preconstruction meeting in PDF format.

**END OF SECTION**

Construction Sign Request Form

City of Fort Lauderdale

Bid 663-11778
P11880

Title (Bold):

Title (Not Bold):

What's Happening?

Benefits:

Number of Neighbors Benefitted:

Cost:

Month and Year of Expected Completion:

Contractor:

Phone: 954-828-8000

We're Working On:

Project Manager Signature

Date

Senior Project Manager Signature

Date

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01600
MATERIAL AND EQUIPMENT****PART 1 GENERAL****1.01 DEFINITIONS****A. Products:**

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 DESIGN REQUIREMENTS

- A. Provide systems, equipment, and components, including supports and anchorages, in accordance with provisions of latest edition of the Florida Building Code. Wind: 150 mph, with exposure condition and an importance factor of 1.15.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions near sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 30 degrees F to 110 degrees F.

1.04 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:

MATERIAL AND EQUIPMENT

01600-16-1224
EXHIBIT 4
Page 177 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Furnish as required by individual Specifications.
 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently Displayed on Each Package, the Following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 4. Deliver Materials to the Following Address: CMS, 4250 NW 10th Ave., Fort Lauderdale, FL 33309
 5. Notify Engineer upon arrival.
 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Engineer of anticipated date and place of arrival.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.05 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current progress schedule and coordinate to avoid conflict with the Work and conditions at site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable. Include UL labels on products so specified.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at site. Inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

MATERIAL AND EQUIPMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.06 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01500, Construction Facilities and Temporary Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- C. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and dust damage. Connect and operate continuously all space heaters furnished in electrical equipment.
- D. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- E. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- F. Hazardous Materials: Prevent contamination of personnel, storage building, and site. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or

MATERIAL AND EQUIPMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

similar process instrumentation and control functions in same or similar manner.

- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.
- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Provide materials and equipment listed by UL wherever standards have been established by that agency.
- J. Equipment Finish:
 - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with finish as approved by Engineer.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.

2.02 FABRICATION AND MANUFACTURE

- A. General:
 - 1. Manufacture parts to U.S.A. standard sizes and gauges.
 - 2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.

MATERIAL AND EQUIPMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible. Oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.02 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.

MATERIAL AND EQUIPMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at site, available for review at all times.
- F. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.03 FIELD FINISHING

- A. In accordance with individual Specification sections.

3.04 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.05 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01640
MANUFACTURERS' SERVICES****PART 1 GENERAL**

1.01 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.02 SUBMITTALS

- A. Informational Submittals:

1. Training Schedule: Submit not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.
2. Lesson Plan: Submit proposed lesson plan not less than 21 days prior to scheduled training and revise as necessary for acceptance.

1.03 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified elsewhere.
- B. Representative subject to acceptance by Owner and Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish manufacturers' services when required by an individual Specification section, to meet the requirements of this Section.
- B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, the time required to perform the specified services shall be considered incidental.
- C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.
- D. Determine, before scheduling services, that all conditions necessary to allow successful testing have been met.
- E. Only those days of service approved by Engineer will be credited to fulfill the specified minimum services.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- F. When specified in individual Specification sections, manufacturer's onsite services shall include:
1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 3. Providing, on a daily basis, copies of all manufacturers' representatives field notes and data to Engineer.
 4. Revisiting the site as required to correct problems and until installation and operation are acceptable to Engineer.
 5. Resolution of assembly or installation problems attributable to, or associated with, respective manufacturer's products and systems.
 6. Assistance during functional and performance testing, and facility startup and evaluation.
 7. Training of Owner's personnel in the operation and maintenance of respective product as required.
 8. Additional requirements may be specified elsewhere.

3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When specified in individual Specification section, submit prior to shipment of product or material.
- B. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Signed by product manufacturer certifying that product or material specified conforms to or exceeds specified. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Engineer.

3.03 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this Section, shall be completed and signed by the equipment manufacturer's representative.
- B. Such form shall certify that the signing party is a duly authorized representative of the manufacturer, is empowered by the manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to assure that the equipment is complete and operational.

3.04 TRAINING

- A. General:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
 2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 01430, Operation and Maintenance Data.
 3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
 4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.
- B. Training Schedule:
1. List specified equipment and systems that require training services and show:
 - a. Respective manufacturer.
 - b. Estimated dates for installation completion.
 - c. Estimated training dates.
 2. Allow for multiple sessions when several shifts are involved.
 3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
 4. Coordinate with Section 01310, Progress Schedules and Section 01810, Equipment Testing and Facility Startup.
- C. Lesson Plan: When specified, prepare for each required course, containing the following minimum information:
1. Title and objectives.
 2. Recommended types of attendees (e.g., managers, engineers, operators, maintenance).
 3. Course description and outline of course content.
 4. Format (e.g., lecture, self-study, demonstration, hands-on).
 5. Instruction materials and equipment requirements.
 6. Resumes of instructors providing the training.
- D. Prestartup Training:
1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01430, Operation and Maintenance Data.
 2. Complete at least 14 days prior to beginning of facility startup.
- E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.05 SUPPLEMENTS

A. The supplement listed below, following "END OF SECTION," are part of this Specification.

1. Forms: Manufacturer's Certificate of Proper Installation.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

Owner _____ EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

☐ Installed in accordance with Manufacturer's recommendations.☐ Inspected, checked, and adjusted.☐ Serviced with proper initial lubricants.☐ Electrical and mechanical connections meet quality and safety standards.☐ All applicable safety equipment has been properly installed.☐ Functional tests.☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate his equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20 ____

Manufacturer: _____

By Manufacturer's Authorized Representative: _____
(Authorized Signature)

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01780
CONTRACT CLOSEOUT****PART 1 GENERAL****1.01 SUBMITTALS****A. Informational Submittals:**

1. Submit prior to application for final payment.
 - a. Record Documents.
 - b. Special Bonds, Special Guarantees, and Service Agreements.
 - c. Consent of Surety to Final Payment.
 - d. Releases or Waivers of Liens and Claims.
 - e. Releases from Agreements.
 - f. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01025, Measurement and Payment.
 - g. Spare Parts, Special Tools and Extra Materials: As required by individual Specification sections.

B. Subcontractor Identification Form:

1. Submit form with final pay request.
2. Submit a separate form for each subcontractor used.
3. For Capital Improvement Projects, submit form along with final pay request to the PUBLIC WORKS DIRECTOR
4. Form is attached as a Supplement to this Section.

1.02 RECORD DOCUMENTS**A. Quality Assurance:**

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.

Prior to submitting each request for progress payment, request PUBLIC WORKS DIRECTOR's review and approval of current status

CONTRACT CLOSEOUT

CAM 11880-24
01780-21
EXHIBIT 4
Page 189 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by PUBLIC WORKS DIRECTOR to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.
- B. In the Event Contractor is Unable to Secure Written Releases:
 - 1. Inform PUBLIC WORKS DIRECTOR of the reasons.
 - 2. Owner or its representatives will examine the site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.
 - 3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory Bond in a sum to cover legal claims for damages.
 - 4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 - 1. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.
 - 2. Delete Engineer title block and seal from all documents.
 - 3. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
 - 4. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded. Contractor is responsible for providing "red-lined" markups of all changes including revised locations of buried features.
 - 5. Contractor shall provide original signed and sealed "as-built" drawings of the new pump station upon completion of construction. He shall

CONTRACT CLOSEOUT

CA 11780-22
01/18/22
EXHIBIT 4

Page 190 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

employ a professional land surveyor licensed in the state of Florida. All work shall be in accordance with City of Fort Lauderdale surveying standards and per NAVD 88.

B. Preservation:

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by PCM or Engineer.

C. Making Entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from Drawings.
 - 2) Red when showing information added to Drawings.
 - 3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
 - a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
 - b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
 - c. Make identification so descriptive that it may be related reliably to Specifications.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.02 FINAL CLEANING

- A. At completion of the Work or of a part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire site or parts thereof, as applicable.
1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and PCM.
 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
 4. Clean all windows.
 5. Clean and wax wood, vinyl, or painted floors.
 6. Broom clean exterior paved driveways and parking areas.
 7. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 8. Rake clean all other surfaces.
 9. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.
 10. Leave water courses, gutters, and ditches open and clean.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
- C. Meet all requirements of Section 02575, Surface Restoration.

3.03 SUPPLEMENTS

- A. The supplements listed below, following "END OF SECTION," are part of this Specification.
1. Subcontractor Identification Form.

END OF SECTION

CONTRACT CLOSEOUT

CA 1178024
01/18/24
EXHIBIT 4
Page 192 of 663

PROJECT 11880

**SUBCONTRACTOR IDENTIFICATION FORM**

This form shall be completed by all City of Fort Lauderdale Prime Contractors who subcontracted out any portion of his/her City contract. The form shall be forwarded to the City of Fort Lauderdale's Public Services Department with the prime contractor's final pay request. A separate form is to be completed and submitted for each subcontractor. Please telephone (954) 761-5057 or 761-5083, if you have any questions regarding this form.

1) CITY OF FORT LAUDERDALE PROJECT NO. _____

2) PROJECT DESCRIPTION _____

3) SUBCONTRACTOR _____

Business Name

Address

Telephone & Fax Nos.

Email Address/Company Website (if applicable)

4) SUBCONTRACTOR'S PRINCIPAL OFFICER _____

5) CLASSIFICATION OF WORK SUBCONTRACTED OUT _____

6) COST OF WORK SUBCONTRACTED OUT _____

7) Please check the item(s) which properly identify the ownership status of the subcontractor's firm:

☐ Subcontractor firm is not a MBE or WBE

☐ Subcontractor firm is a MBE, as at least 51 percent is owned and operated by one or more socially and economically-disadvantaged individuals:

☐ American Indian ☐ Asian ☐ Black ☐ Hispanic ☐ White

☐ Subcontractor firm is a WBE, as at least 51 percent is owned and operated by one or more women.

☐ American Indian ☐ Asian ☐ Black ☐ Hispanic ☐ White

PROJECT 11880

8) **PRIME Contractor** _____

**NAME & TITLE OF PRIME CONTRACTOR'S REPRESENTATIVE COMPLETING
THIS FORM** *(Please Print)*

(Telephone No.) _____ *(Fax No.)* _____ *(Email*
Address) _____

SIGNATURE _____**DATE** _____*Prime Contractor's Representative*

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 01810
EQUIPMENT TESTING AND FACILITY STARTUP****PART 1 GENERAL****1.1 DEFINITIONS**

- A. Facility: Entire Project, or an agreed-upon acceptable portion.
- B. Field Quality Control: Term, as used in individual specification sections, which refers to specified on-site functional and performance testing of equipment.
- C. Functional Test: Test or tests in presence of ENGINEER to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- D. Performance Test: A test performed in presence of ENGINEER and after any required functional test, to demonstrate and confirm that individual equipment meets the performance requirements specified in individual specification sections.
- E. Source Quality Control: Term, as used in individual specification sections, which refers to specified testing performed on specified equipment at manufacturer's facility prior to shipment.
- F. Unit process: As used in this section, a unit process is a portion of the facility that performs a specific process function.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Completed Manufacturer's Certificate of Proper Installation as required by individual specification sections. Submit prior to beginning Facility Startup procedures.
 - 2. Testing:
 - a. Functional and performance test schedules, test plan, procedures, and log format. Submit at least 14 days prior to start of related testing.
 - b. Facility Startup and Performance Evaluation Plan: Submit at least 21 days prior to commencement of startup.
 - 3. Certification of calibration for testing equipment, when so specified.
 - 4. Documentation of HVAC systems balancing results, when so specified.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.1 CONTRACTOR'S TESTING AND STARTUP REPRESENTATIVE**

- A. Designate and furnish one or more CONTRACTOR's personnel to coordinate and expedite testing and facility startup.

EQUIPMENT TESTING AND FACILITY STARTUP

09/10/16-1224
EXHIBIT 4
Page 195 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Such person or persons shall be present during equipment testing and facility startup meetings, and shall be available at all times during the testing, facility startup, and performance evaluation period.

3.2 EQUIPMENT TESTING

A. Preparation:

1. General:
 - a. Complete installation of each unit and related processes before testing, including all related manufacturer's representative services.
 - b. Furnish qualified manufacturer's representatives, when required by individual specification sections, to assist in testing.
 - c. Obtain from equipment manufacturer's representative the Manufacturer's Certificate of Proper Installation Form, in accordance with Section 01640, MANUFACTURERS' SERVICES, when required by individual specification sections.
 - d. Schedule equipment testing and facility startup meetings to discuss test schedule, plan of test, materials, chemicals and liquids required, facilities operations interface, and OWNER involvement.
 - e. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.
2. Equipment Test Report Form: Provide written test report form for each item of equipment to be tested, to include the minimum information:
 - a. OWNER/Project Name.
 - b. Equipment or item tested.
 - c. Date and time of test.
 - d. Type of test performed (Functional or Performance).
 - e. Test conditions.
 - f. Test results.
 - g. Signature space for CONTRACTOR and ENGINEER representatives.
3. Cleaning and Checking: Prior to beginning functional testing:
 - a. Calibrate testing equipment in accordance with manufacturer's instructions.
 - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
 - c. Lubricate equipment in accordance with manufacturer's instructions.
 - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
 - e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
 - f. Check power supply to electric-powered equipment for correct voltage.
 - g. Adjust clearances and torque.
 - h. Test piping for leaks.
 - i. Balance HVAC systems, measuring airflow (cfm) static pressure, and component pressure losses.
4. Ready-to-test determination will be by ENGINEER based at least on the following:

EQUIPMENT TESTING AND FACILITY STARTUP

09/10/16-1224
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Notification by CONTRACTOR of equipment readiness for testing.
- b. Acceptable testing plan.
- c. Acceptable Operation and Maintenance Manuals.
- d. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
- e. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested.
- f. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
- g. Satisfactory fulfillment of other specified manufacturers' responsibilities.
- h. Equipment and electrical tagging complete.
- i. Delivery of all spare parts and special tools.

B. Functional Testing:

1. Conduct as specified in individual specification sections.
2. Notify PCM, ENGINEER, and manufacturer's representative in writing at least 10 days prior to scheduled date of testing.
3. When, in ENGINEER's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual specification sections. Such acceptance will be evidenced by ENGINEER's signature on Equipment Test Report.

C. Performance Testing:

1. Conduct as specified in individual specification sections.
2. Notify PCM and ENGINEER at least 14 days prior to scheduled date of test.
3. Performance testing shall not commence until equipment has been approved by ENGINEER as having satisfied functional test requirements specified.
4. Follow approved testing plan and detailed procedures specified.
5. Source and type of fluid, gas, or solid for testing shall be as specified.
6. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.
7. Prepare performance test report summarizing test method and results.
8. When, in ENGINEER's opinion, equipment meets performance requirements specified, such equipment will be accepted as to conforming to Contract requirements. Such acceptance will be evidenced by ENGINEER's signature on Equipment Test Report.

3.3 FACILITY STARTUP AND PERFORMANCE EVALUATION

A. General:

1. Support OWNER's operations personnel throughout Facility Startup and Performance Evaluation Period.
2. Equipment shall be accepted by ENGINEER as having met requirements of specified functional testing prior to facility startup.

EQUIPMENT TESTING AND FACILITY STARTUP

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Sequence each unit process to the point that the complete facility is operational for evaluation of unit process and facility performance.
4. Demonstrate proper operation of required interfaces within and between individual unit processes.
5. Include equipment furnished by OWNER, if applicable.
6. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays.
7. Schedule ongoing Work so as not to interfere with or delay the completion of facility startup.
8. After the facility is operating, complete performance testing of those items of equipment not previously tested.

B. Facility Startup and Performance Evaluation Plan:

1. Develop a plan in conjunction with OWNER's operations personnel detailing step-by-step instructions for startup of each unit process and the complete facility.
2. Include a method of evaluation and overall performance report for each unit process.
3. Plan shall consist of bound copies of Startup and Performance Evaluation Forms. Use one form for each unit process; use example form attached, or one designed by CONTRACTOR.
4. Startup and Performance Evaluation Form will minimally include the following:
 - a. Description of unit process being started.
 - b. All equipment and devices included in the unit process.
 - c. Unit process startup procedures (i.e., valves to be open/closed, order of equipment startup, etc.).
 - d. Requirements for water, power, and chemicals needed for startup.
 - e. CONTRACTOR Certification that each unit process is capable of performing its intended function(s), including fully automatic operation.
 - f. Space for evaluation comments.

C. Owner Responsibilities:

1. Assist CONTRACTOR in developing a Facility Startup and Performance Evaluation Plan detailing step-by-step instructions for startup of each unit process and the complete facility.
2. Provide water, power, chemicals, and other items as required for testing and facility startup, unless otherwise indicated.
3. Operate process units and devices, with support of CONTRACTOR.
4. Provide labor and materials as required for sampling and laboratory analyses.

D. Facility Startup Period:

1. Startup sequencing of unit processes shall be as chosen by CONTRACTOR and approved by the OWNER.
2. Make adjustments, repairs, and corrections necessary to complete facility startup.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Startup of entire facility or any portion thereof shall be considered complete when, in opinion of ENGINEER, facility or designated portion has operated in manner intended for 5 continuous days without significant interruption. This period is in addition to training, functional, or performance test periods specified elsewhere.
4. Significant Interruption: May include any of the following events:
 - a. Failure of CONTRACTOR to provide and maintain qualified onsite startup personnel as scheduled.
 - b. Failure to meet specified performance for more than 2 consecutive hours.
 - c. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
 - d. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
 - e. As determined by ENGINEER.
5. A significant interruption will require startup then in progress to be stopped and restarted after corrections are made.

E. Facility Performance Evaluation:

1. During the Facility Startup Period, conduct a performance evaluation for purpose of evaluating full capabilities of facility.
2. Certify, on the Facility Performance Evaluation Form, that each unit process is capable of performing its intended function(s), including fully automatic and computerized operation.

3.4 SUPPLEMENT

- A. Supplement listed below, following "END OF SECTION," is a part of this Specification:
 1. Startup and Performance Evaluation Form.

END OF SECTION

**CITY OF FORT LAUDERDALE WATER AND WASTEWATER
CAPITAL IMPROVEMENTS PROGRAM**

STARTUP AND PERFORMANCE EVALUATION FORM

OWNER: _____

PROJECT: _____

Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.): _____

Evaluation Comments: _____

CONTRACTOR Certification that Unit Process is capable of performing its intended function(s), including fully automatic operation:

Firm Name: _____

Startup Representative: _____ **Date:** _____, 20__
(Authorized Signature)

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02200
SITE PREPARATION****PART 1 GENERAL****1.01 DEFINITIONS**

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2 inches caliper to a depth of 12 inches below subgrade.
- D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Project Limits: Areas, as specified, within which Work is to be performed.

1.02 QUALITY ASSURANCE

- A. Obtain Engineer's approval of staked clearing, grubbing, and stripping limits, prior to commencing clearing, grubbing, and stripping.

1.03 SCHEDULING AND SEQUENCING

- A. Prepare site only after adequate erosion and sediment controls are in place. Limit areas exposed uncontrolled to erosion during installation of temporary erosion and sediment controls.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.01 GENERAL**

- A. Clear, grub, and strip areas actually needed for waste disposal, borrow, or site improvements within limits specified.
- B. Property obstructions which are to remain in-place, such as buildings, sewers, drains, water or gas pipes, bridges, etc., are to be carefully protected from damage.
- C. Do not injure or deface vegetation that is not designated for removal. All branches potentially interfering with construction operations shall be pruned

SITE PREPARATION

CA 02200-1
EXHIBIT 4
Page 201 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

prior to starting work and following approval of the Engineer and the City of Fort Lauderdale Urban Forester.

3.02 LIMITS

A. As Follows, but not to Extend beyond Project Limits.

1. Excavation Including Trenches: 5 feet beyond top of cut slopes or shored wall.
2. Fill:
 - a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.
 - b. Stripping and Scalping: 2 feet beyond toe of permanent fill.
3. Waste Disposal:
 - a. Clearing: 5 feet beyond perimeter.
 - b. Scalping and Stripping: Not required.
 - c. Grubbing: Around perimeter as necessary for neat finished appearance.
4. Overhead Utilities:
 - a. Clearing, Grubbing Scalping, and Stripping: Wherever grading is required, including borrow pits, ditches, etc.
5. Other Areas: As shown.

B. Remove rubbish, trash, and junk from entire area within Project limits.

3.03 TEMPORARY REMOVAL OF INTERFERING PLANTINGS

- A. Remove and store, as specified in Section 02930, Trees, Plants, and Ground Covers, shrubs and trees that are not designated for removal but do interfere with construction or could be damaged by construction activities.
- B. Photograph and document location, orientation, and condition of each plant prior to its removal. Record sufficient information to uniquely identify each plant removed and to assure accurate replacement.

3.04 CLEARING

- A. Clear areas within limits specified.
- B. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- C. Cut stumps not designated for grubbing 12 inches below the ground surface.
- D. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.05 GRUBBING

- A. Grub areas within limits specified.

SITE PREPARATION

CA 02206-22
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.06 SCALPING

- A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.
- B. Scalp areas within limits specified.

3.07 STRIPPING

- A. Do not remove topsoil until after scalping is completed.
- B. Strip areas within limits to minimum depths specified. Do not remove subsoil with topsoil.
- C. Stockpile strippings, meeting requirements of Section 02911, Soil Preparation, for topsoil, separately from other excavated material.

3.08 TREE REMOVAL OUTSIDE CLEARING LIMITS

- A. Remove Within Project Limits:
 - 1. Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.
 - 2. Trees designated by Engineer.
- B. Cut stumps off flush with ground, remove debris, and if disturbed, restore surrounding area to its original condition.

3.09 TREE TOPPING

- A. Top trees designated by Engineer so remaining portion will not strike facilities in falling. Where topping will remove more than 1/2 of a tree's crown, remove entire tree.
- B. Treat wounds resulting from topping in accordance with standard horticultural practice to preserve the natural character of the tree.

3.10 PRUNING

- A. Remove branches below the following heights:
 - 1. Sixteen feet above roadways and shoulders.
 - 2. Nine feet above sidewalks.
 - 3. Six feet above roofs.
- B. Prune only after planting and in accordance with standard horticultural practice to preserve the natural character of the plant. Perform in presence of the Engineer. Remove all dead wood, suckers, and broken or badly bruised branches. Use only clean, sharp tools. Do not cut lead shoot.

SITE PREPARATION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.11 DISPOSAL

A. Clearing and Grubbing Debris:

1. Woody debris may be chipped. Chips may be sold to Contractor's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided that resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4-inch by 2 inch. Dispose of chips that are unsaleable or unsuitable for landscaping or other uses with unchipped debris.
2. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

B. Scalpings: As specified for clearing and grubbing debris.

C. Strippings:

1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite or in waste disposal areas approved by Engineer.
2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02240
DEWATERING****PART 1 GENERAL (NOT USED)****PART 2 PRODUCTS (NOT USED)****PART 3 EXECUTION****3.01 GENERAL**

- A. The Contractor shall be responsible for design, installation, and operation of a dewatering system to dewater specified excavations.
 - 1. The dewatering system shall be designed in accordance with the Best Management Practices (BMP's) adopted by FDEP.
 - 2. Inspection and control of dewatering system operations will be in accordance with the FDEP guidelines established in the Florida Erosion and Sediment Control Inspector's Manual (current edition).
- B. Continuously manage and control excavation water recharge in order to facilitate and not impede construction activities at all times, including weekends, holidays, and during periods of work stoppages, and furnish and install, and operate, a contingency backup dewatering system to maintain control of excavation water levels to facilitate construction (i.e.; no construction delays).

3.02 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements specified in Section 01300, Submittals, and the requirements of this Section.
- B. Provide name, address, and phone numbers of all subcontractors.
- C. The Contractor shall submit a Dewatering Best Management Practices (BMP) Plan prior to the start of excavation expected to include dewatering operations. The Plan shall provide detailed descriptions of dewatering procedures to be utilized to meet the requirements of this Section. Methodologies to control dewatering discharge contamination include, but are not limited to:
 - 1. Holding tanks of adequate size and volume.
 - 2. Wellpointing systems.
 - 3. Sump pumping systems.
 - 4. Chemical precipitation of particulates.
 - 5. Filter systems and siltation controls.
 - 6. Outfall booms.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. The Contractor shall provide a Site Health and Safety Plan and Activity Hazard Analysis (AHA) for contaminated soil as specified in Section 02250, Affected Soil and Liquid Disposal, and/or groundwater as specified in this Section, to include the following:
1. A written description of the proposed method for temporary stockpiling, transportation, and disposal of all wastes.
 2. Copy of permits of disposal facilities.
 3. Certification of disposal of all wastes.
 4. Directions to the nearest hospital and phone number.
 5. Emergency contact phone numbers.
 6. Laboratory analyses and sampling plan required for transportation and disposal of all wastes in accordance with applicable federal, state, and local requirements.
- E. Upon Completion of Remediation Activities, the Following shall be Provided:
1. Copy of manifests for all wastes leaving the site.
 2. Copy of the laboratory analyses results from all sampling activities.
 3. Copy of closure reports that may be required.

3.03 SURFACE WATER CONTROL

- A. Remove surface runoff controls when no longer needed.
- B. Seal off or berm catch basins in the area of construction to prevent discharge of untreated dewatering effluent or runoff from unstabilized construction areas into storm drains.
- C. All drain inlets or catch basins used for dewatering discharge shall be provided with silt and sediment removal barriers as approved by the Engineer.
1. All barriers shall be cleaned regularly to avoid sediment discharge into the storm drain system.
 2. Construction activities will be stopped at no cost to the Owner until sediment controls are properly maintained, installed, and in compliance with the dewatering permit.
 3. All barriers shall be removed upon issuance of a hurricane warning.

3.04 DEWATERING SYSTEMS

- A. Design, furnish, and install, operate, and maintain a dewatering system of sufficient size and capacity to permit excavation and subsequent construction activities in water-free conditions, and to lower and maintain the excavation area groundwater level a minimum of 2 feet below the lowest point of excavation. The dewatering system shall be designed and operated such that the system continuously maintains excavations water levels so as to maintain the excavation water level in order to allow for the initiation and completion of excavation backfill compaction and restoration activities.
- B. Dewatering systems shall include, but is not limited to, furnishing and installing wells or well points, and or other equipment and appurtenances as

DEWATERING

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

may be necessary, including system components or equipment, installed outside the outermost perimeter of the excavation limits, and sufficiently below lowest point of excavation, to maintain the specified or required groundwater elevation.

- C. Open trench pumping maybe permitted upon the approval of the Engineer.
- D. Design and Operate Dewatering Systems:
 - 1. To prevent loss of ground as water is removed.
 - 2. To avoid inducing settlement or damage to existing facilities, completed Work, or adjacent property.
 - 3. Avoid surface water pollution or discharge of sediment to storm drain systems or waterways.
- E. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Do not use ditches and sumps as primary means of dewatering. The Contractor shall not direct any flow of water over pavement surfaces. Discharge of water shall be conducted as approved by the local, state, and federal agencies and the Engineer.
- F. Provide controls to prevent surface water from entering excavation pits, trenches, or stockpiled materials.

3.05 PIPELINES CONSTRUCTED UNDER WATER

- A. In the event that it is found that the water in a trench cannot be lowered by ordinary means, i.e., well points and pumps, an alternate construction method may be proposed by the Contractor. Complete details, specifications, manufacturer's descriptive literature, installation lists and any other pertinent data regarding the proposed alternate method shall be submitted as an alternate by the Contractor to the Engineer within 5 calendar days of the time that the Contractor anticipates using such alternate method.
- B. If the Engineer approves the alternate method in writing, it may be used, so long as the Work is performed in a manner which, in the opinion of the Engineer, conforms to the method and procedure as set forth in the information supplied by the Contractor in his original application for use of an alternate method. The Engineer may revoke approval of the alternate method if at any time, in his opinion, the Work is not conforming to any applicable portion of these Specifications.
- C. No pipeline shall be laid under water without approval of the Engineer.
- D. If the dewatering system is eliminated or the effort reduced, and the pipe is laid underwater, additional pipe zone material will be required as backfill to the water table elevation, or to the level it was reduced to.

3.06 DISPOSAL OF WATER

- A. All water generated, pumped, or removed from excavations as a result of excavation dewatering activities shall be collected, containerized, and managed prior to discharge and or treatment at an approved discharge point

DEWATERING

CA 0224023
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

or facility, in accordance with Broward County Code of Regulation, Sections 27-27, 27-193(a), 27-193(b)(3)a and 27-196. Contractor shall secure, obtain, and pay for all necessary local, state, and federal permits, licenses, fees, and or approvals to discharge water or perform onsite or offsite treatment and disposal. Treat water collected by dewatering operations as required by regulatory agencies, prior to discharge.

- B. Discharge water as permitted, and in regulatory compliance with Contractor obtained discharge permits/licenses.
 - 1. All discharge activities shall be performed so as to prevent silt and sediment discharge and eliminate any soil erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.
 - 2. Maximum allowable turbidity of discharges to surface waters or storm drains will be 10 NTU's.
 - 3. Sump discharges cannot be discharged directly to storm drains or surface waters without treatment.
- C. Affected storm sewer outfalls shall be protected with floating silt booms as approved by the Broward County Department of Environmental Planning and Protection (BCDPEP) and the Engineer. All accumulated debris resulting from the dewatering discharge collecting in the boom shall be removed on a daily basis.
- D. Visible silt plumes emanating from the area around the outfalls will be considered a failure of the silt and sediment removal measures and may result in a Notice of Violation issued by BCDPEP. The Contractor will be responsible for all fines associated with the violation of the dewatering permit conditions issued to the Contractor.
- E. Failure to control dewatering discharges as described above and as detailed in the Florida Erosion and Sediment Control Inspector's Manual, may result in an order to cease dewatering operations until the discharge problems are corrected. No claims will be accepted for costs or delays associated with unacceptable dewatering discharge practices.

3.07 WELL POINT REMOVAL

- A. Well point holes shall be filled with sand which shall be washed into the hole.
- B. Well point holes located within asphalt pavement surfaces or concrete pavements, shall be filled with sand to the subgrade. The remaining hole shall be filled with nonshrink grout.

3.08 CONTAMINATED GROUNDWATER AND DISPOSAL REQUIREMENTS

- A. If Contractor suspects, witnesses, or identifies groundwater contamination at any time during the performance of the Work, Contractor shall notify the Engineer immediately. Contractor shall be responsible for sample collection and laboratory analysis.

DEWATERING

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. If analytical testing (by contractor) documents and indicates elevated concentrations above FDEP action levels (Chapter 62-777, Florida Administrative Code) dewatering operations will be suspended until appropriate treatment and or construction measures can be implemented. Contractor shall not resume operations until notified to do so in writing by Broward County. There shall be no delay or mobilization claim. In addition, the local agency will be immediately notified via telephone and in writing by the Engineer. Dewatering activities in the area will not proceed until review of the matter with the local agency is resolved and written authorization is issued.
- C. Treatment of the groundwater will include three options depending on the magnitude of the contamination in the trench or as determined by the Engineer: Granular Activated Carbon (GAC) Treatment Vessels, Mobile Air Stripping Units, or Vacuum Truck Removal and Disposal or other method as approved by the County. The Contractor will provide a submittal list of all qualified groundwater remediation subcontractors for GAC vessel treatment/portable air stripping unit and vacuum truck disposal including phone numbers, contact names, and addresses prior to start of construction. The selected groundwater treatment/recycling facility for hauling contaminated groundwater shall also be identified.
- D. If contaminated groundwater in the dewatering trench is encountered, the remediation operations will begin once local agency approval is obtained.
- E. Effluent water from the treatment system will be analyzed by the contractor to confirm that concentrations are below regulatory limits.
- F. A Dewatering Plan describing the dewatering approach, groundwater monitoring, and remediation alternative is shall be provided by the contractor.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02250
AFFECTED SOIL AND LIQUID DISPOSAL****PART 1 GENERAL****1.1 WORK INCLUDED**

- A. This Section covers the Work necessary to remove, transport, and properly dispose of the following wastes:
1. Liquid petroleum product.
 2. Affected soil.
 3. Free petroleum product.

1.2 DEFINITIONS

- A. Liquid petroleum product (product) is fluid petroleum product partly or entirely composed of diesel fuel or gasoline.
- B. Affected soil is defined herein.
- C. Free petroleum product is defined as a liquid which forms a separate floating phase distinct from the groundwater.

1.3 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements specified in Section 01300, Submittals, and the requirements of this Section.
- B. The Contractor Shall Provide the Following Submittals:
1. A written description of the proposed method for temporary stockpiling, transportation, and disposal of all wastes.
 2. Copy of permits of disposal facilities.
 3. Certification of disposal of all wastes.
 4. Copy of manifests for all wastes leaving the site.
 5. Copy of the laboratory analyses required for transportation and disposal of all wastes in accordance with applicable federal, state, and local requirements.
 6. Provide name, address, and phone number of all subcontractors.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.1 LIQUID PETROLEUM PRODUCT**

- A. Classification of liquid petroleum product shall be made by the ENGINEER.
- B. The Contractor shall remove all liquid petroleum product if discovered in the trench during dewatering operations.

AFFECTED SOIL AND LIQUID DISPOSAL

CA 02250-1
EXHIBIT 4
Page 210 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. If the petroleum product is discovered, the product will be disposed as described herein.
- D. If contamination is discovered and it is determined that it must be removed, the Contractor shall commence remediation activities as determined by the County. There shall be no delay or mobilization claim associated.

3.2 AFFECTED SOIL

- A. Excavation of affected soil shall be accomplished in accordance with Section 02316, Excavation. The soil may be contaminated with petroleum product which may be partly or entirely diesel fuel, gasoline, or chlorinated solvents.
- B. Classification of affected soil for disposal purposes will be determined by the contractor using an Organic Vapor Monitor (OVM) with photo ionization detector or equivalent. Soils with vapor readings higher than 10 parts per million (ppm) for diesel as defined in Chapter 62-770 of the Florida Administrative Code, are excessively contaminated and will be identified by the contractor for treatment and disposal. Affected soil must be placed on an impermeable barrier when temporarily stockpiled. All stockpile leachate or runoff must be collected for disposal in accordance with applicable federal, state, and local regulations. Soils designated for removal and disposal shall be prepared for shipment, transported, and disposed of in accordance with the requirements of this Section.
- C. Affected soils shall be transported and disposed of in accordance with federal, state, and local regulations. The Contractor shall be responsible for all soil analyses required for transportation and disposal. It shall be the responsibility of the contractor to provide the manifests for the proper disposal of the contaminated material, and provide copies to the Engineer.
- D.deleted.....

3.3 FREE PETROLEUM PRODUCT

- A. Some free petroleum products which may be partly or entirely diesel fuel or gasoline may be encountered during excavation activities. The Contractor shall remove free petroleum product, if necessary, when a separate floating phase greater than 0.10-inch thick is present as required by health and safety considerations. The free petroleum product shall be removed by skimming, pumping to an oil/water separator, or other approved methods.
- B. Free petroleum products shall be transported and disposed by the Contractor in accordance with federal, state, and local regulations. The Contractor is responsible for any laboratory analyses required for disposal of the free petroleum products.

3.4 TRANSPORT AND DISPOSAL

- A. Transport Regulations: The Contractor shall be responsible for the loading, labeling, placarding, marking, weighing, and transporting of all waste materials in accordance with the Florida Department of Transportation

AFFECTED SOIL AND LIQUID DISPOSAL

CA 118-022
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Regulations, and U.S. Department of Transportation Regulations. The Contractor shall use only transporters that are licensed and competent to haul these wastes.

3.5 WASTE CONTAINERS

- A. Each transport container of waste shall be visually inspected by the Contractor for leaks, drips, or container damage prior to being loaded. Containers which are found to be leaking or damaged shall not be loaded until the damage is repaired. The Contractor shall prepare the transport container to prevent spillage or contamination. The Contractor shall notify the Engineer 2 hours before any loaded transport leaves the site.
- B. All transport containers leaving the site shall be inspected by the Contractor to ensure that no waste material adheres to the wheels or undercarriage.
- C. All vehicles on which waste is adhering shall be cleaned by sweeping tires and undercarriage or by other dry methods prior to leaving the site.

3.6 SHIPPING RECORDS

- A. The Contractor shall prepare accurate shipping records for any wastes leaving the site in accordance with applicable federal and state regulations. The Contractor shall be responsible for providing copies of the records to the Engineer and shall immediately notify the Engineer of any problems in completing shipments and disposal of wastes.
- B. The Contractor shall:
 - 1. Be responsible for appropriate measurement of unit quantity (weight or volume) of waste material removed from the site.
 - 2. Coordinate vehicle inspection and recording of quantities leaving the site with the Engineer. These quantities shall be compared to recorded quantities received at the treatment or disposal facilities. The Contractor shall resolve any discrepancies occurring immediately, determining the probable cause for the discrepancy.
 - 3. Be solely responsible for any and all actions necessary to remedy situations involving waste spiked in transit.
- C. The Contractor shall ensure that a copy of the manifest is returned to the Engineer by the designated treatment or disposal facility within 14 days of receipt of the material to be disposed.

3.7 COORDINATION

- A. The Contractor shall at any time provide the Engineer with safe access to the Work whenever it is in preparation or progress for the purposes of conducting inspections or collecting samples. The Contractor may conduct concurrent sampling and analyses, if desired. Results of any such sampling and analysis shall be furnished to the Engineer at no cost.

PART 4 PAYMENT**AFFECTED SOIL AND LIQUID DISPOSAL**

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4.1 GENERAL

- A. Payment for work in this Section is included as stated in the Bid Form. The Contractor shall be responsible for appropriate measurement of unit quantity (volume or weight) of waste material removed from the site, and for verification of those quantities with receipt records from the disposal site.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02260
EXCAVATION SUPPORT AND PROTECTION****PART 1 GENERAL (NOT USED)****PART 2 PRODUCTS (NOT USED)****PART 3 EXECUTION****3.01 GENERAL**

- A. The Contractor shall be responsible to design, provide, and maintain shoring, sheeting, and bracing as necessary to support the sides of excavations and to prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed Work.
- B. Consider all available geotechnical information available when designing the excavation support system.

3.02 REMOVAL OF EXCAVATION SUPPORT

- A. Remove excavation support in a manner that will maintain support as excavation is backfilled.
- B. Do not begin to remove excavation support until support can be removed without damage to existing facilities, completed Work, or adjacent property.
- C. Remove excavation support in a manner that does not leave voids in the backfill.

3.03 TRENCHES

- A. For trench excavation exceeding 5 feet in depth, provide adequate safety system meeting requirements of the Occupational Safety and Health Administration's (OSHA), Trench Safety Standards, 29 C.F.R., S.1926.650, Subpart P, and all subsequent revisions or updates adopted by the Department of Labor and Employment Security.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02315
FILL AND BACKFILL****PART 1 GENERAL****1.01 DEFINITIONS**

- A. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and subgrade preparation.
- B. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- C. Lift: Loose (uncompacted) layer of material.
- D. Geosynthetics: Geotextiles, geogrids, or geomembranes.
- E. Well-Graded:
 - 1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
 - 2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
 - 3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
- F. Influence Area: Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:
 - 1. 1-foot outside outermost edge at base of foundations or slabs.
 - 2. 1-foot outside outermost edge at surface of roadways or shoulder.
 - 3. 0.5-foot outside exterior at spring line of pipes or culverts.
- G. Borrow Material: Material from required excavations or from designated borrow areas on or near site.
- H. Selected Backfill Material: Materials available onsite that Engineer determines to be suitable for specific use.
- I. Imported Material: Materials obtained from sources offsite, suitable for specified use.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- J. Structural Fill: Fill materials as required under structures, pavements, and other facilities.
- K. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.

PART 2 PRODUCTS**2.01 EARTHFILL**

- A. Excavated material from required excavations and designated borrow sites, free from rocks larger than 3 inches, from roots and other organic matter, ashes, cinders, trash, debris, and other deleterious materials.
- B. Material containing more than 10 percent gravel, stones, or shale particles is unacceptable.
- C. Provide imported material of equivalent quality, if required to accomplish Work.

2.02 GRANULAR FILL

- A. Use graded aggregate base material of uniform quality throughout, substantially free from vegetable matter, shale, lumps and clay balls, and having a Limerock Bearing Ratio value of not less than 100.
- B. Aggregate is composed of limestone, marble, or dolomite.
- C. Use material retained on the No. 10 sieve composed of aggregate meeting the following requirements:
 - 1. Soundness Loss, Sodium, Sulfate: AASHTO T 104, 15 percent.
 - 2. Percent Wear: AASHTO T 96 (Grading A) 45 percent.

Sieve Size	Percent by Weight Passing
2 inch	100
1-1/2 inch	95 to 100
3/4 inch	65 to 90
3/8 inch	45 to 75
No. 4	35 to 60
No. 10	25 to 45
No. 50	5 to 25
No. 200	0 to 10

2.03 WATER FOR MOISTURE CONDITIONING

- A. Free of hazardous or toxic contaminates, or contaminants deleterious to proper compaction.

FILL AND BACKFILL
 CA 151329
 025132
 EXHIBIT 4

Page 216 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.04 FOUNDATION STABILIZATION ROCK

- A. General: Materials may be either limerock, shell rock, cemented coquina, or shell base sources approved by the Department.
- B. Specific Requirements for Limerock: For limerock, carbonates of calcium and magnesium shall be at least 70 percent. Materials having a plasticity index of more than ten or a liquid limit greater than 40 shall not be used as a stabilizer. The gradation of limerock shall be FDOT No. 57 stone or such that 97 percent of these materials will pass a 3-1/2 inch sieve.
- C. Crushed Shell: Crushed shell for this use shall be mollusk shell (i.e., oysters, mussels, clams, cemented coquina). Steamed shell will not be permitted.
 - 1. This shell shall Meet the Following Requirements:
 - a. Material having a plasticity index of more than ten or a liquid limit greater than 40 shall not be used as a stabilizer.
 - b. At least 97 percent by weight of the total material shall pass a 3-1/2 inch sieve and at least 50 percent by weight of the total material shall be retained on the No. 4 sieve.
 - c. Not more than 20 percent by weight of the total material shall pass the No. 200 sieve. The determination of the percentage passing the No. 200 sieve shall be by washing only.
 - d. In the event that the shell meets the above requirements without crushing, crushing will not be required.

PART 3 EXECUTION

3.01 GENERAL

- A. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.
- B. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.
- C. During filling and backfilling, keep level of fill and backfill around each structure and buried tank even.
- D. If Pipe, Conduit, Duct Bank, or Cable is to be Laid Within Fill or Backfill:
 - 1. Fill or backfill to an elevation 2 feet above top of item to be laid.
 - 2. Excavate trench for installation of item.
 - 3. Install bedding, if applicable, as specified in Section 02320, Trench Backfill.
 - 4. Install item.
 - 5. Backfill pipe zone and remaining trench, as specified in Section 02320, Trench Backfill, before resuming filling or backfilling specified in this Section.

FILL AND BACKFILL

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

E. Tolerances:

1. Final Lines and Grades: Within a tolerance of 0.1 foot, unless dimensions or grades are shown or specified otherwise.
2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

F. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

3.02 BACKFILL UNDER AND AROUND STRUCTURES

A. Under Facilities: Within influence area beneath structures, slabs, pavements, curbs, piping, conduits, duct banks, and other facilities, backfill with granular fill, unless otherwise shown. Place granular fill in lifts of 6-inch maximum thickness and compact each lift to a density of at least 100 percent of the maximum density as determined by AASHTO T99, Method C.

3.03 FILL

A. Outside Influence Areas Beneath Structures, Pavements, Curbs, Slabs, Piping, and Other Facilities: Unless otherwise shown, place earthfill as follows:

1. Allow for proper thickness of topsoil where required.
2. Maximum 8-inch thick lifts.
3. Place and compact fill across full width of embankment.
4. Compact to a density of at least 80 percent of the maximum density as determined by AASHTO T99, Method C.
5. For the outer layer of all fill where plant growth will be established, DO NOT COMPACT. Leave this layer in a loose condition to a minimum depth of 6 inches.
6. Dress completed embankment with allowance for topsoil, crest surfacing, and slope protection, where applicable.

3.04 SITE TESTING

A. Gradation:

1. One sample from each 1,500 tons of finished product or more often as determined by Engineer, if variation in gradation is occurring, or if material appears to depart from Specifications.
2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.
3. Remove material placed in Work that does not meet Specification requirements.

B. In-Place Density Tests: In accordance with AASHTO T99, Method C. During placement of materials, test as follows:

1. Earthfill: One test per 400 feet of pipe run.

FILL AND BACKFILL

CA 0251324
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Granular Fill: One test per 400 feet of pipe run.
3. Foundation Stabilization Rock: One test per lift.

3.05 REPLACING OVEREXCAVATED MATERIAL

- A. Replace excavation carried below grade lines shown or established by Engineer as follows:
1. Beneath Footings: Granular fill.
 2. Beneath Fill or Backfill: Same material as specified for overlying fill or backfill.
 3. Beneath Slabs-On-Grade: Granular fill.
 4. Trenches:
 - a. Unauthorized Overexcavation: Either foundation stabilization rock or granular pipe base material, as specified in Section 02320, Trench Backfill.
 - b. Authorized Over-excavation: Foundation stabilization rock.
 5. Permanent Cut Slopes (Where Overlying Area is Not to Receive Fill or Backfill):
 - a. Flat to Moderate Steep Slopes (3 to 1, Horizontal Run: Vertical Rise or Flatter): Earthfill.
 - b. Steep Slopes (Steeper than 3 to 1):
 - 1) Correct over-excavation by transitioning between over-cut areas and designed slope adjoining areas, provided such cutting does not extend offsite or outside easements and right-of-ways, or adversely impacts existing facilities, adjacent property, or completed Work.
 - 2) Backfilling over-excavated areas is prohibited unless, in Engineer's opinion, backfill will remain stable, and overexcavated material is replaced as compacted earthfill.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02316
EXCAVATION****PART 1 GENERAL****1.01 QUALITY ASSURANCE**

- A. Provide adequate survey control to avoid unauthorized over-excavation.

1.02 WEATHER LIMITATIONS

- A. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.03 SEQUENCING AND SCHEDULING

- A. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 02200, Site Preparation, prior to excavating.
- B. Contractor shall call the utility companies 72 hours before excavation, see Section 01040, Coordination for each utility company phone number and contact person.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.01 GENERAL**

- A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.
- B. It shall be the Contractor's responsibility to notify business establishments and residents not less than 72 hours prior to construction. Contractor shall, wherever necessary, provide temporary sidewalks and driveway entrances at his own expense, including safe bridges over trenches and fencing around excavations for pedestrian protection.
- C. Provide adequate survey control to avoid unauthorized overexcavation. Do not overexcavate without written authorization of Engineer. If the Contractor excavates beyond the limits shown or specified, the Contractor shall replace such excavation at his own expense. Replace overexcavated material as specified in Section 02315, Fill and Backfill.
- D. Where muck, rock, clay, or other material within the limits of excavation is unsuitable in its original position, excavate such material to the cross-sections

EXCAVATION

CA 02316-1
EXHIBIT 4
Page 220 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

shown or specified. Backfill with suitable material and shape to the required cross-section.

- E. Remove or protect obstructions as shown on the Drawings.

3.02 UNCLASSIFIED EXCAVATION

- A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.

3.03 TRENCH WIDTH

- A. Minimum Width of Trenches:

1. Single Pipes, Conduits, Direct-Buried Cables, and Duct Banks:
 - a. Less than 4-Inch Outside Diameter or Width: 18 inches.
 - b. Greater than 4-Inch Outside Diameter or Width: 18 inches greater than outside diameter or width of pipe, conduit, direct-buried cable, or duct bank.
2. Multiple Pipes, Conduits, Cables, or Duct Banks in Single Trench: 18 inches greater than aggregate width of pipes, conduits, cables, duct banks, plus space between.
3. Increase trench widths by thicknesses of sheeting, if used.
4. The maximum trench width shall not exceed the minimum stated width of the trench unless approved by the Engineer. Restoration for excavation beyond the minimum required width shall be at the Contractor's sole expense.

3.04 EMBANKMENT AND CUT SLOPES

- A. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.
- B. Remove stones and rock that exceed 3-inch diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.
- C. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite or outside easements and right-of-ways, or adversely impacts existing facilities, adjacent property, or completed Work.

3.05 STOCKPILING EXCAVATED MATERIAL

- A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.
- B. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated position.

EXCAVATION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Confine stockpiles to within easements, rights-of-way, and approved work areas. Do not obstruct roads, streets, public thoroughfares, or access to fire hydrants.
- D. Do not stockpile excavated material adjacent to trenches and other excavations unless excavation sideslopes and excavation support systems are designed, constructed, and maintained for stockpile loads.
- E. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

3.06 DISPOSAL OF SPOIL

- A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite.
- B. Dispose of debris resulting from removal of underground facilities as specified in Section 02220, Demolition, for demolition debris.
- C. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Section 02200, Site Preparation, for clearing and grubbing debris.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02319
SUBGRADE PREPARATION****PART 1 GENERAL****1.01 DEFINITIONS**

- A. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.
- B. Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of topsoil prior to placement of fill, roadway structure or base for floor slab.
- C. Proof-Rolling: Testing of subgrade by compactive effort to identify areas that will not support the future loading without excessive settlement.

1.02 QUALITY ASSURANCE

- A. Notify Engineer when subgrade is ready for compaction or proof-rolling or whenever compaction or proof-rolling is resumed after a period of extended inactivity.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.01 GENERAL**

- A. Keep subgrade free of water, debris, and foreign matter during compaction or proof-rolling.
- B. Bring subgrade to proper grade and cross-section and uniformly compact surface.
- C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.
- D. Maintain prepared ground surface in finished condition until next course is placed.

3.02 COMPACTION

- A. Under Earthfill: Compact upper 6 inches to minimum of 80 percent of the maximum density as determined by AASHTO T99, Method C.
- B. Under Pavement , Floor Slabs On Grade, or Granular Fill Under Structures: Compact the upper 6 inches or as shown on the Drawings, to minimum of 100 percent of the maximum dry density as determined by AASHTO T180.

SUBGRADE PREPARATION

CA 02319-24
EXHIBIT 4
Page 223 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.03 MOISTURE CONDITIONING

- A. Dry Subgrade: Add water, then mix to make moisture content uniform throughout.
- B. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.

3.04 TESTING

- A. Proof-roll subgrade with equipment specified in Article Compaction to detect soft or loose subgrade or unsuitable material, as determined by Engineer.

3.05 CORRECTION

- A. Soft or Loose Subgrade:
 - 1. Adjust moisture content and recompact, or
 - 2. Over excavate as specified in Section 02316, Excavation, and replace with suitable material from the excavation, as specified in Section 02315, Fill and Backfill.
- B. Unsuitable Material: Over excavate as specified in Section 02316, EXCAVATION, and replace with suitable material from the excavation, as specified in Section 02315, Fill and Backfill.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02320
TRENCH BACKFILL****PART 1 GENERAL****1.01 DEFINITIONS**

- A. Base Rock: Granular material upon which manhole bases and other structures are placed.
- B. Bedding Material: Granular material upon which pipes, conduits, cables, or duct banks are placed.
- C. Imported Material: Material obtained by the Contractor from source(s) offsite.
- D. Lift: Loose (uncompacted) layer of material.
- E. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe, conduit, cable or duct bank.
- F. Prepared Trench Bottom: Graded trench bottom after excavation and installation of stabilization material, if required, but before installation of bedding material.
- G. Selected Backfill Material: Material available onsite that Engineer determines to be suitable for a specific use.
- H. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Well-Graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.

PART 2 PRODUCTS**2.01 GEOTEXTILE**

- A. As specified in Section 02371, Geotextiles.

2.02 MARKING TAPE

- A. Plastic:
 - 1. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
 - 2. Thickness: Minimum 4 mils.
 - 3. Minimum Width: 2 inches.
 - 4. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.

TRENCH BACKFILL

CA 02320-1
EXHIBIT 4
Page 225 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

5. Manufacturers and Products:
 - a. Reef Industries; Terra Tape.
 - b. Allen; Markline.
- B. Metallic:
 1. Solid aluminum foil, visible on unprinted side, encased in a protective high visibility, inert polyethylene plastic jacket.
 2. Foil Thickness: Minimum 5.5 mils.
 3. Width: 2 inches.
 4. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
 5. Joining Clips: Tin or nickel-coated furnished by tape manufacturer.
 6. Manufacturers and Products:
 - a. Reef Industries; Terra "D".
 - b. Allen; Detectatape.
- C. Color: In accordance with APWA Uniform Color Code for Temporary Marking of Underground Facilities.

Color ^a	Facility
Red	Electric power lines, cables, conduit, and lightning cables
Orange	Communicating alarm or signal lines, cables, or conduit
Yellow	Gas, oil, steam, petroleum, or gaseous materials
Green	Sewers and drain lines
Blue	Water, irrigation, and slurry lines
^a As specified in ANSI Z53.1, Safety Color Code.	

2.03 TRENCH STABILIZATION MATERIAL

- A. Foundation stabilization rock as specified in Section 02315, Fill and Backfill.

2.04 BEDDING MATERIAL AND PIPE ZONE MATERIAL

- A. Granular fill as specified in Section 02315, Fill and Backfill.

2.05 EARTH BACKFILL

- A. Earth fill as specified in Section 02315, Fill and Backfill.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

- A. Water Control:
 1. As specified in Section 02240, dewatering.
 2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.

TRENCH BACKFILL

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Provide continuous water control until trench backfill is complete.
- B. Remove foreign material and backfill contaminated with foreign material that falls into trench.
- C. Where the trench has been dewatered, backfilling must be done before the pumps are shut off so that the pipe will not float. Any pipe which has been displaced because of floatation will be removed and installed correctly at the Contractor's expense.

3.02 TRENCH BOTTOM

- A. Firm Subgrade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.
- B. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify Engineer. Engineer will determine depth of overexcavation, if any, required.

3.03 TRENCH STABILIZATION MATERIAL INSTALLATION

- A. Rebuild trench bottom with trench stabilization material as directed by the Engineer.
- B. Place material over full width of trench in 6-inch lifts to required grade, providing allowance for bedding thickness.
- C. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.04 BEDDING

- A. Furnish granular fill or imported bedding material as directed by the Engineer.
- B. Place over the full width of the prepared trench bottom in two equal lifts when the required depth exceeds 8 inches.
- C. Hand grade and compact each lift to provide a firm, unyielding surface.
- D. Minimum thickness from the following depths below the bottom to the springline of the pipe are as follows, except increase depths listed by 6 inches in areas of rock excavation:
 1. Pipe, 15 Inches and Smaller: 4 inches.
 2. Pipe, 18 Inches to 36 Inches: 6 inches.
 3. Pipe, 42 Inches and Larger: 8 inches.
 4. Conduit: 3 inches.
 5. Direct-Buried Cable: 3 inches.
 6. Duct Banks: 3 inches.
- E. Check grade and correct irregularities in bedding material. Loosen top 1 to 2 inches of compacted bedding material with a rake or by other means to

TRENCH BACKFILL

CA 016-024
02520-3
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

provide a cushion before laying each section of pipe, conduit, direct-buried cable, or duct bank.

- F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.
- G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.05 BACKFILL PIPE ZONE

- A. Furnish granular fill or imported bedding material as directed by the Engineer.
- B. Upper Limit of Pipe Zone Shall Not Be Less Than Following:
 - 1. Pipes:
 - a. Up to 12-Inch Diameter: 6 inches above top of pipe.
 - b. Greater than 12-Inch Diameter: 12 inches above top of pipe, unless shown otherwise.
 - 2. Conduit: 3 inches, unless shown otherwise.
 - 3. Direct-Buried Cable: 3 inches, unless shown otherwise.
 - 4. Duct Bank: 3 inches, unless shown otherwise.
- C. Restrain pipe, conduit, cables, and duct banks as necessary to prevent their movement during backfill operations.
- D. Place material simultaneously in lifts on both sides of pipe and, if applicable, between pipes, conduit, cables, and duct banks installed in same trench. Compact to 90 percent density as determined by AASHTO T99.
 - 1. Pipes 10 Inches and Smaller Diameter: First lift less than or equal to 1/2 pipe diameter but not less than 3 inches. .
 - 2. Pipes Over 10-Inch Diameter: Maximum 6-inch lifts.
- E. Thoroughly tamp each lift, including area under haunches, with handheld tamping bars supplemented by "walking in" and slicing material under haunches with a shovel to ensure that voids are completely filled before placing each succeeding lift. Compact material in pipe zone to at least 98 percent maximum density as determined by AASHTO T180.
- F. After the full depth of the pipe zone material has been placed as specified, compact the material by a minimum of three passes with a vibratory plate compactor only over the area between the sides of the pipe and the trench walls. Contractor shall exercise proper care to ensure that no pipe joints will be broken, damaged, or disturbed through the use of any compacting equipment.
- G. Do not use power-driven impact compactors to compact pipe zone material.
- H. Where approved by the Engineer, hydraulic compaction of the pipe zone material and granular trench backfill may be used providing density testing

TRENCH BACKFILL

CA 118-024
025204
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

requirements are met. A submittal describing the method of hydraulic compaction will be required.

3.06 MARKING TAPE INSTALLATION

- A. Continuously install marking tape along centerline of all buried piping, on top of last lift of pipe zone material. Coordinate with piping installation drawings.
 - 1. Metallic Marking Tape: Install with nonmetallic piping and waterlines.
 - 2. Plastic Marking Tape: Install with metallic piping.

3.07 BACKFILL ABOVE PIPE ZONE

- A. General:
 - 1. Process excavated material to meet specified gradation requirements.
 - 2. Adjust moisture content as necessary to obtain specified compaction.
 - 3. Do not allow backfill to free fall into the trench or allow heavy, sharp pieces of material to be placed as backfill until after at least 2 feet of backfill has been provided over the top of pipe.
 - 4. Do not use power driven impact type compactors for compaction until at least 4 feet of backfill is placed over top of pipe.
 - 5. Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable.
 - 6. Backfill around structures with same class backfill as specified for adjacent trench unless otherwise shown or specified.
 - 7. Hydraulic compaction may be allowed based upon approval by the Engineer of the Contractor's detailed compaction and testing procedures.
- B. Backfill for Areas in Landscaped Areas:
 - 1. Place in lifts not exceeding 12-inch thickness.
 - 2. Mechanically compact each lift to a minimum of 80 percent of the maximum density prior to placing succeeding lifts.
- C. Backfill for Areas Under Facilities and Pavements: Backfill trench above the pipe zone with granular backfill in lifts not exceeding 12 inches. Compact each lift to a minimum of 98 percent of the maximum density compaction as determined by AASHTO Method T180, 100% for Broward County rights of way, prior to placing succeeding lifts.

3.08 ALTERNATE METHOD OF CONSTRUCTION

- A. When high water tables, porous soils or other limitations to dewatering are encountered, the Contractor may request the approval of the Engineer for an alternate method of construction.
- B. Use of alternative methods shall not relieve the Contractor of the work, result in increased costs to the Owner or reductions in the quality of the work as defined by testing and acceptance requirements.

TRENCH BACKFILL

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Removal of water requirements will be waived and the pipe and appurtenances will be permitted to be installed underwater.
- D. Excavation shall be performed in accordance with Section 02316, Excavation, to the specified limits. The excavation shall be cleared of silt and other fines.
- E. Pipe bedding shall be placed from the bottom of the excavation to 6 inches above the top of the pipe. The bedding shall be granular fill as described in Section 02315 Fill and Backfill.
- F. Select backfill material shall be used to backfill the trench from the top of the bedding to a level 1 foot above the standing water level in the trench. Select material shall be FDOT # 57 stone or granular fill as described in Section 02315, Fill and Backfill. This lift shall be compacted in accordance with the provisions of this Section after which the remainder of the backfill can proceed as normal.
- G. If the above described method is used, all backfill material used below the water table shall not be released into the trench until the bucket or container is less than 1 foot above the water level. Pipe bedding and pipe zone material as defined above shall not be dumped or pushed into the trench.

3.09 MAINTENANCE OF TRENCH BACKFILL

- A. After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface until final surface restoration is completed.
- B. Other Areas: Add excavated material where applicable and keep the surface of the backfilled trench level with the adjacent ground surface.
- C. Water shall be applied to the unstabilized trench backfill to control dust as directed by the Engineer.
- D. Placement of lime rock base course and prime coat shall occur no longer than 5 days following trench backfill or as soon there after as record information is available to verify that pipe inverts and slopes are acceptable.

3.10 SETTLEMENT OF BACKFILL

- A. Settlement of trench backfill, or of fill or facilities constructed over trench backfill within the warranty period for the project will be considered a result of defective compaction of trench backfill.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02500
CONVEYANCE PIPING - GENERAL****PART 1 GENERAL****1.01 DELIVERY, STORAGE, AND HANDLING**

- A. In accordance with manufacturer's recommendations and as specified in the individual Specification(s) following this Section.
- B. Marking at Plant: Mark each pipe and fitting at plant. Include date of manufacture, manufacturer's identification, specification standard, diameter of pipe, pipe class, and other information required for type of pipe.
- C. Pipe, specials, and fittings received at Project site in damaged condition will not be accepted.
- D. Gasket Storage: Store rubber gaskets in cool, well ventilated place and do not expose to direct rays of sun. Do not allow contact with oils, fuels, petroleum, or solvents.
- E. Handling:
 - 1. Heavy canvas, or nylon slings of suitable strength shall be used for lifting and supporting materials. Do not use chains or cables.
 - 2. Lifting pipe during unloading or lifting into trench shall be done using two slings placed at quarter point of pipe section. Pipe may be lifted using one sling near center of pipe, provided pipe is guided to prevent uncontrolled swinging and no damage will result to pipe or harm to workmen. Slings shall bear uniformly against pipe.
 - 3. Pipe and fittings shall not be stored on rocks or gravel, or other hard material that might damage pipe. This includes storage area and along pipe trench.

PART 2 PRODUCTS**2.01 PIPE**

- A. As specified in the individual Specification(s) following this Section and as shown on the Drawings.
- B. Color Coding for Water Mains:
 - 1. All pipe used for water main applications shall be color-coded blue in accordance with FAC 62-555.320(21)(b)(3).
 - 2. Continuous blue stripes, parallel to the axis of the pipe, shall be applied using tape or paint applied to the dry pipe exterior surface.
 - 3. Pipe striped during manufacture shall have stripes applied at 90-degree intervals around the pipe that remain intact following installation of the pipe.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Pipe striped during installation shall be in a continuous line along the top of the pipe. Pipes 24 inches and greater shall have two additional stripes on each side.
5. Aboveground water main piping shall be color-coded or marked similar to underground piping.

2.02 JOINTS

- A. As specified in the individual Specification(s) following this Section.

2.03 COUPLINGS

A. General:

1. Coupling linings for use in potable water systems shall be in conformance with NSF 61B. Linings for wastewater piping shall be in accordance with the provisions of Section 02502, Ductile Iron Pipe and Fittings.
2. Couplings shall be rated for appropriate operating pressure and hydrostatic test pressure.
3. Exposed, bolted, sleeve-type couplings shall be lined and coated with fusion bonded epoxy in accordance with AWWA C213.
4. Buried, bolted, sleeve-type couplings shall be lined and coated with fusion bonded epoxy in accordance with AWWA C213.

B. For Pipe with Plain Ends:

1. Bolted, sleeve-type couplings, in accordance with AWWA C219.
2. Fabricated steel, mechanical slip-type expansion joints, in accordance with AWWA C221.

- C. Unless thrust restraint is provided by other means, bolted, sleeve-type couplings shall be harnessed. Harness details shall be in accordance with requirements of appropriate reference standard or as shown on Drawings.

D. For Pipe with Grooved Ends:

1. Grooved couplings, in accordance with AWWA C606. System shall provide for flexible or rigid joints as shown on Drawings.
2. Exposed couplings shall be lined and coated with fusion bonded epoxy in accordance with AWWA C213.
3. Buried couplings shall be lined and coated with fusion bonded epoxy in accordance with AWWA C213.

E. For Pipe with Flanged Ends:

1. Flanged coupling adapters, in accordance with AWWA C219.
2. Dismantling joints for connecting flanged pipe shall be AWWA C219 compliant. Studs and nuts provided to seal gasket shall be separate and independent from tie-bar restraint system.

- F. Bolting Materials: As recommended by coupling manufacturer for specified conditions.

CONVEYANCE PIPING – GENERAL

CA 02500-22
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.04 SLEEVES

- A. Sleeves shall be long or short pattern as appropriate to the application conforming to AWWA C110.
- B. Sleeves shall be mechanical joint with restraint if required, provided by external mechanical joint restraints.
- C. Sleeves shall have a minimum pressure rating of 250 psi.
- D. Linings and coatings ductile iron sleeves shall be in accordance with the provisions of Section 02502, Ductile Iron Pipe and Fittings.

2.05 TAPPING SLEEVES – DUCTILE IRON

- A. Ductile iron tapping sleeves are preferred for force main and water main taps.
- B. Tapping sleeves shall meet ASTM A536 Grade 65-45-12.
- C. Side flange seals shall be O-ring type with round, oval, or rectangular cross section.
- D. Contractor shall inspect and/or verify diameter of the pipe to be tapped and order the correct sleeve.
- E. Sleeves shall be coated in accordance with the provisions of this Specification.
- F. Tapping sleeve and tapping valve shall be of the same or compatible manufacturer to assure proper fit of the aligning ring on the valve and the recess on the sleeve. No post factory modifications to either the sleeve or valve will be permitted.
- G. Tapping sleeve shall be American Flow Control Series 1004 or 2800, Mueller H-615, US Pipe T-9 or Clow F-5205.
- H. Tapping machine and cutter shall provide the full-size of the tapped connection.
- I. The coupon shall be removed from the pipe shall be given to the PCM.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.06 TAPPING SLEEVES - STEEL

- A. Steel tapping sleeves are acceptable for use where ductile iron sleeves are not practical and as approved by the Engineer.
- B. Tapping sleeve composed of two halves of heavy welded steel, bolting together on the pipe and sealing against a concave Buna-N wedge gasket around the nozzle opening. Both halves of the sleeve are fabricated to accurately conform to the outside diameter of the ductile iron host pipe and to provide reinforcement without the use of shims or pads.
- C. The sleeve half opposite the nozzle shall be solid and shall not consist of straps or U-bolts. Sleeve and nozzle shall be fabricated from ASTM 285, Grade C, carbon steel. Branch leg flange shall conform to AWWA, Class D, Schedule C-207, 150-pound drilling to match tapping valve. The flange face shall be recessed to accommodate the tapping valve in accordance with MSS-SP60. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.
- D. The ferrous metal parts of the fitting shall receive a factory applied fusion-bonded, epoxy coating, 12-mil minimum dry film thickness in accordance with AWWA C213.
- E. Minimum wall thickness of the sleeve shall be 0.375 inch.
- F. Tapping sleeve shall be pressure rated to 150 psi, minimum.
- G. Tapping sleeve shall be , Dresser Style 630, JCM Series 412; or equal.
- H. Tapping machine and cutter shall provide the full-size of the tapped connection.
- I. The coupon removed from the pipe shall be given to the PCM.

2.07 SERVICE SADDLES

- A. Service saddles shall be ductile iron with double stainless steel straps conforming to AWWA C-111/A.21.11-00.

2.08 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

- A. Modular Mechanical Seal:
 - 1. Type: Interconnected synthetic rubber links shaped and sized to continuously fill annular space between pipe and wall sleeve opening.
 - 2. Assemble interconnected rubber links with Type 316 stainless steel bolts, nuts, and pressure plates.
 - 3. Size modular mechanical seals according to manufacturer's instructions for the size of pipes shown to provide a watertight seal between pipe and wall sleeve opening.
 - 4. Manufacturers and Products:
 - a. Thunderline/LinkSeal, Div. Of PSI, Houston, TX; Link Seal.
 - b. Calpico, Inc., South San Francisco, California; Sealing Linx.

CONVEYANCE PIPING – GENERAL

CA 0250024
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

c. Advance Products and Systems, Lafayette, Louisiana; Innerlynx.

B. Wall Sleeves:

1. Diameter, ends, and length shall be as shown on Drawings.
2. Shall include integral seep ring to minimize seepage between metal sleeve and concrete.

C. Wall Couplings:

1. Diameter, ends, and length shall be as shown on Drawings.
2. Wall couplings shall provide flexible mechanical joint.
3. Body and end rings shall be coated with fusion bonded epoxy.
4. Body shall include integral seep ring.
5. Shall comply with AWWA C219.

D. If core drilling is required for penetrations of existing concrete walls or slabs, locations of drilling shall be determined by radiograph to avoid damage to reinforcing steel and conduits.

2.09 FLANGES, FLANGE GASKETS, AND BOLTING MATERIALS

- A. As specified in individual Specifications following this Section.
- B. Flanges, bolting materials, and flange gaskets for steel flanges shall conform to AWWA C207.
- C. Flanges, bolting materials, and flange gaskets for ductile iron flanges shall conform to AWWA C110 and C115.

2.10 INSULATING FLANGES AND COUPLINGS

A. Dielectric Flange Manufacturers:

1. Pipeline Seal and Insulator, Inc.; Houston, Texas.
2. Central Plastics Co.; Shawnee, Oklahoma.
3. Calpico, Inc.; South San Francisco, California.

B. Insulating Flanges:

1. Bolt holes sized as required.
2. Manufacturers and Products:
 - a. Dresser Industries; Style 39.
 - b. Baker Coupling Company, Inc.; Series 216.

2.11 PIPE LOCATING TAPE

- A. As specified in Section 02320, Trench Backfill.

2.12 PIPE BEDDING AND PIPE ZONE MATERIAL

- A. Granular material as specified in Section 02320, Trench Backfill.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.13 TRENCH STABILIZATION MATERIAL

- A. As specified in Section 02320, Trench Backfill.

PART 3 EXECUTION

3.01 GENERAL

- A. Notify Engineer at least 2 weeks prior to field fabrication of pipe or fittings.
- B. Furnish feeler gauges of proper size, type, and shape for use during installation for each type of pipe furnished.
- C. Distributing Materials: Place materials along trench only as will be used each day, unless otherwise approved by Engineer. Placement of materials shall not be hazardous to traffic or to general public, obstruct access to adjacent property, or obstruct others working in area.

3.02 EXAMINATION

- A. Verify size, material, joint types, elevation, and horizontal location of existing pipeline to be connected to new pipeline or new equipment.
- B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.
- C. Damaged Coatings and Linings: Repair using coating and lining materials in accordance with manufacturer's instructions.

3.03 PREPARATION

- A. Prepare trench as specified in Section 02316, Excavation.
- B. Unless otherwise permitted by Engineer, maximum length of open trench shall not exceed 400 feet.
- C. Trench Grade:
 - 1. Grade bottom of trench by hand to specified line and grade, with proper allowance for pipe thickness and pipe base, when specified. Trench bottom shall form a continuous and uniform bearing and support for pipe between bell holes.
 - 2. Before laying each section of pipe, check grade and correct irregularities found. Grade may be disturbed for removal of lifting tackle.
- D. Pipe Bedding: Place and compact pipe bedding material as follows:
 - 1. Install to full width of trench, from the following depths below bottom to springline of pipe:
 - a. For Pipe 12-Inch Diameter: 4 to 6 inches.
 - b. For Pipe Larger than 12-Inch Diameter: 6 to 8 inches.
 - 2. Compact to at least 98 percent of its maximum density as determined by AASHTO T180.

CONVEYANCE PIPING – GENERAL

CA 02501326
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Ensure that no unfilled or uncompacted areas occur beneath pipe.
- E. Bell (Joint) Holes: At each joint, dig bell holes of ample dimensions in bottom of trench, and at sides where necessary, to permit joint to be made properly and to permit easy visual inspection of entire joint.

3.04 INSTALLATION

A. General:

1. Provide and use proper implements, tools, and facilities for safe and proper prosecution of Work.
2. Lower pipe, fittings, and appurtenances into trench, piece by piece, by means of a crane, slings, or other suitable tools and equipment, in such a manner as to prevent damage to pipe materials, protective coatings and linings.
3. Do not drop or dump pipe materials into trench.
4. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.
5. Install individual pipe lengths in according to approved lay diagram. Misplaced pipe shall be removed and replaced.
6. Inspect pipe and fittings before installation, clean ends thoroughly, remove foreign matter and dirt from inside.
7. Flanged Joints:
 - a. Install perpendicular to pipe centerline.
 - b. Bolt Holes: Straddle vertical centerline, aligned with connecting equipment flanges or as shown on Drawings.
 - c. Use torque-limiting wrenches to provide uniform bearing and proper bolt tightness.
 - d. Flange Type: Use flat-faced flange when joining with flat-faced ductile or cast iron flange.
8. Couplings:
 - a. Install in accordance with manufacturer's written instructions.
 - b. Before coupling, clean pipe holdback area of oil, scale, rust, and dirt.
 - c. Do not remove pipe coating. If damaged, repair before joint is made.
 - d. Clean and lubricate gaskets before installation.
 - e. Tighten coupling bolts progressively, drawing up bolts on opposite sides gradually until bolts have uniform tightness.

B. Cleaning Pipe and Fittings:

1. Remove lumps, blisters, and excess coating from bell and spigot ends of each pipe. Wire brush outside of spigot and inside of bell and wipe clean, dry, and free from oil and grease before pipe is laid.
2. Wipe ends of mechanical joint pipe and fittings and of rubber gasket joint pipe and fittings clean of dirt, grease, and foreign matter.

C. Laying Pipe:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Direction of Laying: Lay pipe with bell end facing in direction of laying. For lines on an appreciable slope, face bells upgrade at discretion of Engineer.
2. Mechanical Joint, Push-On Joint, and Restrained Joint Pipe: After first length of pipe is installed in trench, secure pipe in-place with approved backfill material tamped under and along sides to prevent movement. Keep ends clear of backfill. After each section is jointed, place backfill as specified to prevent movement.
3. Take precautions necessary to prevent floating of pipe prior to completion of backfill operation.
4. When using movable trench shield, take necessary precautions to prevent pipe joints from pulling apart when moving shield ahead.
5. Do not allow foreign material to enter pipe while it is being placed in trench.
6. Close and block open end of last laid section of pipe to prevent entry of foreign material or creep of gasketed joints when laying operations are not in progress, at close of day's work, or whenever workers are absent from job.
7. Pipe shall be installed in a straight alignment and deflections made as required after the joint has been completed.

D. Joining Push-On Joint Pipe and Mechanical Joint Fittings:

1. Join pipe with push-on joints and mechanical joint fittings in strict accordance with manufacturer's recommendations.
2. Provide special tools and devices, such as, special jacks, chokers, and similar items required for installation.
3. Lubricate all pipe gaskets and pipe ends using lubricant furnished by pipe manufacturer. No substitutes will be permitted.
4. Clean ends of fittings of dirt, mud, and foreign matter by washing with water and scrubbing with a wire brush, after which, slip gland and gasket on plain end of pipe. Lubricate end of pipe to facilitate sliding gasket in place, then guide fitting onto spigot of pipe previously laid.

E. Cutting Pipe:

1. General: Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging pipe or lining and so as to leave a smooth end, at right angles to axis of pipe.
2. Pipe: Cut pipe with milling type cutter or saw. Do not flame cut.
3. Dressing Cut Ends: Dress cut end of mechanical joint pipe to remove sharp edges or projections, which may damage rubber gasket. Dress cut ends of push-on joint pipe by beveling, as recommended by manufacturer.

F. Buried Pressure Pipe:

1. Concrete Encased or Embedded Pipe: Do not encase joints in concrete unless specifically shown on Drawings.
2. Placement:
 - a. Keep trench dry until pipe laying and joining is completed. If the excavation cannot be effectively dewatered the Contractor shall propose alternate pipe installation methodology for approval by

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- the Engineer prior to proceeding. All requirements of Section 02320, Trench Backfill, will remain in effect.
- b. Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
 - c. Measure for grade at pipe invert, not at top of pipe.
 - d. Excavate trench bottom and sides of ample dimensions to permit proper joining, welding, visual inspection, and testing of entire joint.
 - e. Prevent foreign material from entering pipe during placement.
 - f. Close and block open end of last laid pipe section when placement operations are not in progress and at close of day's work.
 - g. In general, lay pipe upgrade with bell ends pointing in direction of laying.
 - h. Deflect pipe at joints for pipelines laid on a curve using unsymmetrical closure of spigot into bell. If joint deflection of standard pipe lengths will not accommodate horizontal or vertical curves in alignment, provide:
 - 1) Shorter pipe lengths.
 - 2) Special mitered joints.
 - 3) Standard or special fabricated bends.
 - i. Check gasket position with feeler gauge to assure proper seating.
 - j. After joint has been made, check pipe alignment and grade.
 - k. Place sufficient pipe zone material to secure pipe from movement before next joint is installed.
 - l. Prevent uplift and floating of pipe prior to backfilling.
3. Tolerances:
 - a. Deflection From Horizontal Line: Maximum 2 inches.
 - b. Deflection From Vertical Line: Maximum 1 inch.
 - c. Joint Deflection: Maximum of 75 percent of manufacturer's recommendation.
 - d. Horizontal position of pipe centerline on alignment around curves maximum variation of 1 foot from position shown.
 4. Cover Over Top of Pipe: Minimum 3 feet, unless otherwise shown.
 5. Disposal of Excess Excavated Material: As specified in Section 02316, Excavation.

G. Line and Grade:

1. No high points will be allowed between air valves on pressure piping.
2. Maintain pipe grade between invert elevations to provide minimum clearance at air valve locations from existing ground surface to top of pipe.
3. Install air valves as shown on the Drawings and as verified in the field and field verify intervening low points. When field conditions warrant, exceptions may be made upon approval of Engineer.
4. Deviations exceeding 1/2 inch from specified line or 1/4 inch from specified grade will not be allowed without express approval of Engineer.
5. Pipeline sections that are not installed to elevations shown or installed as approved by Engineer shall be reinstalled to proper elevation.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.05 THRUST RESTRAINT

- A. Location: At pipeline tees, plugs, valves, caps, bends, and locations where unbalanced forces exist, and as shown on the Drawings.
- B. All pressure pipe will be restrained at all valves and fittings. Provide additional restraint as shown on the Drawings.
- C. Use of thrust blocks is not permitted.

3.06 CORROSION PROTECTION

- A. Buried Pipe: As specified in the individual Specifications following this Section.
- B. Notify Engineer at least 3 days prior to start of surface preparation, coating application, and corrosion protection work.

3.07 PLACEMENT OF PIPE LOCATING TAPE

- A. Place pipe locating tape in accordance with Section 02320, Trench Backfill.

3.08 PIPE BEDDING AND PIPE ZONE MATERIAL

- A. Place pipe bedding and pipe zone material in accordance with Section 02320, Trench Backfill.

3.09 FIELD QUALITY CONTROL – INSPECTION AND TESTING

- A. General:
 - 1. Notify Engineer in writing at least 15 days in advance of testing. Perform testing in presence of Engineer.
 - 2. Using water as test medium, all newly installed pipelines shall successfully pass hydrostatic leakage test prior to acceptance.
 - 3. Conduct field hydrostatic test on buried piping after trench has been completely backfilled. Testing may, as approved by Engineer, be done prior to placement of asphaltic concrete or roadway structural section.
 - 4. Contractor may, if field conditions permit and as approved by Engineer, partially backfill trench and leave joints open for inspection and conduct initial service leak test. Final field hydrostatic test shall not, however, be conducted until backfilling has been completed as specified above.
 - 5. Supply of Temporary Water: In accordance with Section 01500, Construction Facilities and Temporary Controls.
 - 6. Install restraint as necessary to prevent movement of pipe and protect adjacent piping or equipment. Make necessary taps in piping prior to testing.
 - 7. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.
 - 8. New Piping Connected to Existing Piping: Isolate new piping with grooved-end pipe caps, blind flanges, or other means as acceptable to Engineer.

CONVEYANCE PIPING – GENERAL

01500-120
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

9. Service connections for water mains are to be installed to the angle stop prior to disinfection and testing of the installed main.
10. Fire hydrant leads are to be installed to the shut-off valve prior to disinfection and testing of the installed main.

B. Tapping Sleeve and Valve:

1. Install mechanically restrained test plug with relief port.
2. Test tapping sleeve and valve prior to performing tap.
 - a. Test at 150 psi for 15 minutes.
 - b. Successful test will be no visible leakage.
3. Test sleeve and valve together with valve open.

C. Hydrostatic Testing Procedure:

1. Furnish testing equipment, as approved by Engineer, which provides observable and accurate measurements of leakage under specified conditions.
2. Maximum Filling Velocity: 0.25 foot per second calculated based on full area of pipe.
3. Expel air from piping system during filling.
4. Test Pressure: 150 psi as measured at low point of pipeline.
5. Apply and maintain specified test pressure with hydraulic force pump. Valve off piping system when test pressure is reached.
6. Maintain hydrostatic test pressure continuously for 2 hours minimum, adding makeup water only as necessary to restore test pressure.
7. Determine actual leakage by measuring quantity of water necessary to maintain specified test pressure for duration of test.

D. Maximum Allowable Leakage:

$$Q = \frac{LD(P)^{1/2}}{148,000}$$

where:

Q = Quantity of makeup water, in gallons per hour.

L = Length of pipe section tested, in feet.

D = Nominal diameter of pipe, in inches.

P = Average test pressure during hydrostatic test, in pounds per square inch.

3.10 CLEANING AND DISINFECTION

- A. Pipelines shall be kept clean during installation. Following assembly and testing, and prior to disinfection and final acceptance, flush pipelines with water at 2.5 fps minimum flushing velocity until foreign matter is removed.
- B. Water shall be obtained from a potable, City source and shall be metered. The City shall be notified at least 2 working days prior to the intended use such that the meter can be installed. The Contractor shall pay the City for all water used. Water cost shall be incidental to the related pipeline installation work items.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Flushing shall be accomplished by partially opening and closing valves several times under expected line pressures with velocities adequate to remove foreign materials from the pipe, valves, and hydrants.
- D. If impractical to flush large diameter pipe at 2.5 fps, clean pipe by use of pipe pig as approved by Engineer. Multiple passes of pipe pig may be required to adequately clean line.
- E. Remove accumulated debris through blowoffs 2 inches and larger or by removing spools and valves from piping. If hydrants are used, they must be adequately flushed and cleaned prior to being put into service.
- F. Disinfection of Water Mains: As specified in Section 02519, Disinfection of Water Systems.

3.11 ABANDONMENT OF WATER MAINS

- A. Water mains, 8 inches and less, being replaced shall be abandoned in-place.
- B. When new mains have been tested, approved, and services relocated, cut, cap, and restrain any connections to remaining pressurized mains.

3.12 REPAIR OF DAMAGED PIPING

- A. All existing piping damaged by the Contractor as a result of construction activities shall be repaired by the Contractor.
 - 1. The Utilities Department shall be notified of all water main and force main damage and for all control valve operation.
 - 2. Damage to unmarked mains shall be considered additional work or will be repaired by the Owner.
 - 3. Damage to marked mains shall be repaired at no additional cost to the Owner.
- B. Cleaning and disinfection of water main repairs shall be in accordance with the provisions of Section 02519, Disinfection of Water Systems.
- C. If the Owner is required to make repairs for damaged mains that are the responsibility of the Contractor, the cost of the work will be charged to the Contractor.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02502
DUCTILE IRON PIPE AND FITTINGS****PART 1 GENERAL****1.1 SUBMITTALS****A. Quality Control Submittals:**

1. Manufacturer's Certificate of Compliance, in accordance with Section 01640, Manufacturers' Services, stating that inspections and specified tests have been made and that results thereby comply with requirements of Article Source Quality Control.
2. Field Hydrostatic Testing Plan: Submit at least 15 days prior to testing and at minimum, include the following:
 - a. Testing dates.
 - b. Piping systems and section(s) to be tested.
 - c. Method of isolation.
 - d. Method of conveying water from source to system being tested.
 - e. Calculation of maximum allowable leakage for piping section(s) to be tested.
3. Certifications of Calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.
4. Test documentation form and results.

PART 2 PRODUCTS**2.1 MATERIALS****A. Pipe:**

1. General:
 - a. Centrifugally cast, grade 60-42-10 iron, minimum 350 psi working pressure for pipes 12 inches and less, minimum 250 psi working pressure for pipes 14 inches and greater.
 - b. Meet requirements of AWWA C151, C110, C153, and C111.
 - c. Lined and coated as specified.
2. Pressure rating of pipe to be specified according to the particular requirements of the Project.
3. Pipe wall thickness of threaded pipe for a flanged pipe end shall be minimum special thickness Class 53 from 4-inch to 54-inch and/or minimum pressure Class 350 for 60-inch to 64-inch diameter pipe in accordance with AWWA C115.
4. Grooved end pipe, for all pipe diameters, shall be minimum Special Class 53.
5. Pipe shall be new and recently manufactured. Refurbished pipe shall not be provided.

B. Joints:

DUCTILE IRON PIPE AND FITTINGS

CA 02502-1
EXHIBIT 4

Page 243 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Push-On Joint: Rated at minimum working pressure equal to pipe material design.
 2. Restrained Joint:
 - a. Manufactured proprietary joint that mechanically restrains pipe to adjoining pipe.
 - b. Manufacturers and Products:
 - 1) U.S. Pipe; TR Flex, Restrained Tyton, and Field-Lok.
 - 2) American Cast Iron Pipe; Flex-Ring, Lok-Ring, and Fast-Grip.
 - 3) One bolt fittings as manufactured by One Bolt, Inc., for restrained fittings 12 inches in diameter and less.
 - c. Use of restraining gaskets for planned joint restraint is restricted to pipes 12 inches in diameter or less.
 3. Mechanical Wedge Action Type Joint: Use only in areas where adjoining to fixed points where laying length is determined in field. Prior to purchase and installation, type and application of this joint shall be approved by ENGINEER. Use of mechanical joint restraint or field-restraining type gaskets in excess of 12 inches shall not be allowed, unless an unexpected field condition requires cutting the pipe and installation of a field applied restraint. Use of set screws to provide restraint of any kind is not permitted.
 - a. Manufacturers and Products:
 - 1) Meg-a-lug, as manufactured by EBBA Iron.
 - 2) Stargrip, as manufactured by Star Pipe Products.
 - 3) Grip-ring, as manufactured by Romac.
 4. Flanged Joint: Threaded 250 psi working pressure ductile iron flanges conforming to AWWA C115 for Class 125 flanges.
 5. Grooved Joint:
 - a. Rigid and/or Flexible type radius cut grooved, conforming to AWWA C606, depending on the particular application.
 - b. As manufactured by Victaulic Company of America.
- C. Fittings:
1. Ductile Iron, Push-On, Flanged or Restrained Joint: In accordance with AWWA C110 or C153; 250 psi minimum working pressure for 4- to 24-inch fittings and 250 psi minimum working pressure for 24- to 64-inch fittings and AWWA C111.
 2. Mechanical Joint Fittings: In accordance with AWWA C111.
 3. Grooved End Fittings:
 - a. Radius cut grooved, rigid and/or flexible type conforming to AWWA C110 and/or AWWA C153 as above.
 - b. Manufacturers:
 - 1) Victaulic Company of America.
 - 2) Gustin-Bacon.
 4. Fittings shall be new and recently manufactured. Refurbished fittings will not be accepted.
- D. Welded Outlet: Only weld to pipe in manufacturer's shop – may be used in lieu of a tee where economical and where subject to manufacturer's limitations.

DUCTILE IRON PIPE AND FITTINGS

CA 0250224
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

E. Lining:

1. Pipe and fittings for clean water applications shall be cement lined and asphaltic seal coated in accordance with AWWA C104.
2. Pipe and fittings for wastewater applications shall be lined with 40-mils Protecto 401 ceramic epoxy, or equivalent.

F. Coating:

1. Buried Pipe: Asphaltic coating, 1 mil thick, in accordance with AWWA C151, C115, C110, and C153.
2. Exposed Pipe: Coal-tar epoxy, 2 coats, 16 mils thick, primed in accordance with the manufacturers recommendations and surface prepared to SP 5-91 (SSPC standards).

G. Polyethylene Encasement:

1. All buried ductile iron pipe and fittings shall be encased, unless otherwise indicated.
2. Virgin polyethylene raw material conforming to requirements of ASTM D4976.
3. Elongation: 800 percent, minimum in machine and transverse direction (ASTM D882).
4. Tensile Strength: 3,600 psi, minimum.
5. Dielectric Strength: 800V/mil-thickness, minimum.
6. Propagation Tear Resistance: 2,550 gf, minimum in machine and transverse direction (ASTM 1922).
7. Tube form, conforming to AWWA C105.
8. Film shall have minimum in thickness of 0.008 in (8 mil).

H. Bolting:

1. Bolts for flanged connections shall be carbon steel, ASTM A307, Grade A hex bolts and ASTM A563, Grade A hex head nuts.
2. Bolts for grooved end connections shall be manufacturer's standard.

I. Gaskets:

1. Gaskets for flat faced 150 and 250 psi working pressure flanges shall be 1/8-inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200 degrees F, conforming to ANSI B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2.
2. Gaskets for grooved end joints shall be Halogenated butyl, conforming to ASTM D2000 and AWWA C606.
3. Tor-seal or equal gaskets shall be used for exposed, flanged joints.

J. Pressure Test Gauges:

1. Heavy duty industrial quality gauges.
2. Oil-filled.

2.2 SOURCE QUALITY CONTROL

DUCTILE IRON PIPE AND FITTINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. Factory Tests: In accordance with AWWA C104, C105, C110, C111, C115, C150, C151, C153, or C606, as required by the particular Project application.

PART 3 EXECUTION**3.1 EXAMINATION**

- A. Inspect pipe and fittings to ensure no cracked, broken, or otherwise defective materials are being used.

3.2 INSTALLATION

- A. In accordance with AWWA C605, ASTM D2321, and AWWA Manual 23, Section 02500, Conveyance Piping – General, and Section 02320, Trench Backfill.
- B. Field Welding:
1. Use of field welded outlets will not be allowed. Welding for outlets shall be performed only in pipe manufacturer's shop.
 2. Field installed outlets may be installed with saddle approved by Engineer. Opening in pipe shall be machined cut and not with cutting torch.
 3. Field welding of bars for restrained joint systems will not be allowed. All welding shall be performed in pipe manufacturer's shop.
- C. Polyethylene Encasement:
1. Encase pipe, fittings, and valves where specified in accordance with AWWA C105, Method A.
 2. Cut polyethylene tube approximately 2 feet longer than pipe length.
 3. Slip tube around pipe, centering to provide 1-foot overlap on each adjacent section.
 4. Pull encasement to take out slack and wrap snug around pipe.
 5. Secure overlap in place and fold at quarter points of pipe length.
 6. Wrap and tape encasement snug around fittings and valves.

3.3 TESTING AND INSPECTION

- A. In accordance with the provisions of Section 02500, Conveyance Piping-General.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02509
POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS****PART 1 GENERAL****1.01 DELIVERY, STORAGE, AND HANDLING**

- A. Solvent Cement: Store in accordance with ASTM D2855.
- B. In general PVC pipe will be used for small diameter (4-8 inch) water distribution piping.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Pipe:
 - 1. All PVC pressure pipe shall be C-900, minimum SDR-18 with a minimum pressure rating of 150 psi, conforming to requirements of AWWA C900 and AWWA C905.
 - 2. Dimension Ratio (DR) shall be in accordance with the particular application and as shown on Drawings.
 - 3. Pipe to be used for potable water conveyance shall be manufactured from National Sanitation Foundation (NSF) approved compounds.
 - 4. Pipe to be used for force mains shall be the color green, and pipes to be used for water mains shall be the color blue or have continuous blue stripes parallel to the pipe axis located at 90-degree intervals around the pipe.
 - 5. All PVC pipe shall have a No. 6, single strand, copper wire placed on top of the pipe. The wire shall be electrically continuous over the length of the pipe and fastened every 10 feet with a No.12 copper wire.
- B. Joints:
 - 1. Rubber gasketed.
 - 2. Conform to AWWA C900, AWWA C905, and ASTM D3139.
- C. Fittings: PVC or DI, as recommended by pipe manufacturer. DI fittings shall conform with the requirements of Section 2502, Ductile Iron Pipe and Fittings.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

D. Service Saddles:

1. Double strap type with minimum strap width of 2 inches.
2. Straps shall be Type 304 stainless steel. Saddles shall be ductile iron, epoxy-coated, 10 mils minimum thickness.

E. Restrained Joints: Pipe restraint, where indicated on Drawings, shall be provided by system using wedges or gripping teeth or by integral pipe system restraint. System shall be specifically recommended for use on PVC pipe. Systems with set screws shall not be used.

1. Restraint is required at all valves and fittings and for additional pipe length as shown on the Drawings.
2. Manufacturer and Products:
 - a. EBBA Meg-a-lug.
 - b. Star Pipe Products Stargrip.
 - c. Romac Grip-Ring.
 - d. Certainteed style restrained joints where available for size of pipe.
 - e. Solvent welded joints as appropriate and as shown on the Drawings.
 - f. Or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with AWWA C605, ASTM D2321, and AWWA Manual 23, the Uni-Bell Plastic Pipe Association PVC Pipe Manual, Section 02500, Conveyance Piping – General, and Section 02320, Trench Backfill.
- B. Solvent cement used for joints as recommended by pipe manufacturer.
- C. Joints:
 1. Rubber Gasketed: In accordance with manufacturer's written instructions.
 2. Solvent Cemented: In accordance with ASTM D2855.
 3. Restrained Joint Systems: In accordance with manufacturer's written instructions.
- D. Pipe Bending for Horizontal or Vertical Curves:
 1. Radius of curves shall not exceed 75 percent of manufacturer's recommended values.
 2. Use blocks or braces at pipe joints to ensure axial deflection in gasketed or mechanical joints does not exceed allowable deflection.
- E. Maximum Joint Deflection: 75 percent of manufacturer's recommended values.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.02 INSPECTION AND HYDROSTATIC TESTING

- A. In accordance with the provisions of Section 02500, Conveyance Piping - General.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02518
WATER SERVICE CONNECTIONS****PART 1 GENERAL****1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this Section:
1. American Society for Testing and Materials (ASTM):
 - a. A120, Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless for Ordinary Uses.
 - b. B32, Standard Specification for Solder Metal.
 - c. B88, Standard Specification for Seamless Copper Water Tube.
 - d. D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Material.
 2. Federal Specification (FS):
 - a. WW-P-406, Pipe, Steel (Seamless and Welded For Ordinary Use).
 - b. WW-V-54D, Valve, Gauge, Bronze (125, 150, and 200 Pounds, Screwed Flanged, Soldered End, for Land Use).
 3. American Water Works Association (AWWA): C800, Underground Service Line Valves and Fittings.

PART 2 PRODUCTS**2.01 SERVICE CONNECTION**

- A. Furnish components same size as nominal designation of service pipe. For example, a 2-inch connection may consist of, but may not be limited to:
1. Two-inch corporation stop.
 2. Two-inch angle valve.
 3. Two-inch tees, bends, and adapters.
 4. Two-inch ball valve.
 5. Two-inch meter couplings.
- B. Single and double service connections shall be 1-½ inch diameter tubing, reducing to 1 inch at the meter stop. Larger diameters shall be as shown on the Drawings. Unless shown on the Drawings, all meter stops shall be 1 inch with outlet size based on meter size.
- C. All fittings and components to be provided with Mueller 110 compression joint, Ford Quick joint, or approved equal.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.02 SERVICE SADDLES

Mainline Material	Characteristics	Manufacturer
DI or PVC Pressure Pipe	Double-strap; Mueller tap; neoprene gaskets; double stainless steel straps, epoxy coated	Ford Type FC-202; or equal specific to mainline material

2.03 CORPORATION STOPS

Service Size	Characteristics	Manufacturer & Model
2 inch	Brass AWWA I.P thread at inlet and conductive compression connection for CTS OD tubing including the stainless steel liner Mueller No. 506141	Mueller No. B-25028; or equal
1-½ inch	Brass AWWA I.P thread at inlet and conductive compression connection for CTS OD tubing including the stainless steel liner Mueller No. 506139	Mueller No. B-25028; or equal
1 inch	Brass AWWA I.P thread at inlet and conductive compression connection for CTS OD tubing including the stainless steel liner Mueller No. 504385	Mueller No. B-25028; or equal

2.04 COUPLINGS

Service Size	Characteristics	Manufacturer & Model
All Sizes	Three-part union; copper-to-copper for connecting new copper service pipe to existing copper service pipe; other coupling as required to connect new copper service to existing other-than-copper pipe; compression connection outlet	Mueller or Ford compression connection or equal

2.05 FLEXIBLE COUPLINGS

- A. Characteristics: Straight cast couplings.
- B. Manufacturer: Smith-Blair; Model No. 441.

WATER SERVICE CONNECTIONS

02518-2
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.06 UNIONS

- A. Characteristics: Copper-to-copper union.
- B. Manufacturers:
1. Mueller Co.; Model H-15400.
 2. Hays Manufacturing Co.; Model 5615.

2.07 MISCELLANEOUS FITTINGS

- A. Characteristics: Miscellaneous fittings, reducers, and adapters all with Mueller No. 110 compression connection, Ford Quick Joint; or equal.
- B. Manufacturers:
1. Mueller Co.:
 - a. H-15381 Service Tee.
 - b. H-15343 Y Branch.
 - c. H-15526 Quarter Bend.
 2. Hays Manufacturing Co.

2.08 ANGLE METER STOPS

Service Size	Characteristics	Manufacturer & Model
2 inch	Ground key angle meter stop, conductive compression for CTS OD tubing, including the stainless steel liner Mueller No. 506141, and Mueller No. 110 compression connection	Mueller No. H-14277; or equal
1-1/2 inch	Ground key angle meter stop, conductive compression for CTS OD tubing, including the stainless steel liner Mueller No. 506139, and Mueller No. 110 compression connection	Mueller No. H-14277; or equal
1 inch	Ground key angle meter stop, conductive compression for CTS OD tubing, including the stainless steel liner Mueller No. 504385, and Mueller No. 110 compression connection	Mueller No. H-14259; or equal

2.09 BALL VALVES

Service Size	Characteristics	Manufacturer & Model
--------------	-----------------	----------------------

WATER SERVICE CONNECTIONS

02518-3
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Service Size	Characteristics	Manufacturer & Model
3 inches or less	Bronze body, quarter turn	B-25209 Mueller 300 Ball Curb Valve with 110 compression connection; or equal

2.10 PRESSURE REDUCING VALVES

Manufacturer shall be Mueller Co.; Model H-9300, No. 2, 2 inches with strainer, or equal where shown on the Drawings.

2.11 METER BOXES, VAULTS, AND COVERS

Service Size	Characteristics	Manufacturer & Model
All Services	Straight-wall HDPE with cast iron reading lid; 17 inches by 30 inches minimum for 1.5- and 2-inch services 13 inches by 24 inches for all smaller services	CDR Systems, Inc., Associated Plastics, Inc.; or approved equal.

2.12 METERS

Service Size	Characteristics	Manufacturer & Model
All Services	Meters to be supplied by OWNER	—

2.13 COPPER TUBING

A. Size: 3/4-inch and 1-inch service connections.

B. Characteristics:

1. Type K, soft, seamless.
2. Conform to ASTM B88.
3. Commercially pure wrought copper solder joint fittings.
4. Joints:
 - a. 95-5 coreless wire solder.
 - b. Conform to ASTM B32, Grade 95 TA.

2.14 POLYETHYLENE PLASTIC PIPE

A. Size: 3/4-, 1-, 1-1/2-, and 2-inch services.

WATER SERVICE CONNECTIONS

02518-24
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Characteristics:

1. Manufactured from ultra-high molecular weight, high density polyethylene 3408.
2. Conforming to ASTM 2737.
3. Working Pressure: 200 psi.
4. Standard dimension ratio of 9.

C. Manufacturer shall be Phillips Products Co.; Driscopipe 5100; or equal.

D. All PE tubing shall have a No. 12-gauge, single-strand, coated, copper wire wrapped around the pipe or on top of the pipe fastened with a No. 12-gauge coated, copper wire every 10 feet.

PART 3 EXECUTION

3.01 GENERAL

- A. Install service connections, excluding meters, during or after construction of the main.
- B. Install complete service with angle stop installed in the meter box with meter end plugged.
- C. Water Meters: Installed by others.
- D. Depth of cover over the service pipe shall be minimum 30 inches.
- E. No connection shall be made to the main until pressure and bacteriological tests have been conducted and approved by the Owner.

3.02 CONNECTION TO MAIN

- A. Clean exterior of main of dirt and other foreign matter that may impair the quality of the completed connection. Disinfect all fittings in chlorine solution prior to assembly. See Section 02519, Disinfection of Water Systems, for disinfection requirements.
- B. Place service clamp at desired location.
- C. Clamp by tightening alternate nuts progressively.
- D. Do not place service clamp within 1 foot of pipe joint, or another clamp.
- E. Make taps with adapters for the size main being tapped.
- F. All connections to mains shall be made under the direction of the OWNER.
- G. All meter service connections shall be bronze from a plug valve. No gate valves shall be used on services 2 inches or less.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

H. For Existing Services:

1. Remove and dispose of old meter boxes where directed, fill and restore area to match surroundings. Abandon the old service and properly terminate open ends. The Contractor shall be compensated for removal and replacement of meter boxes under the appropriate Bid items.
2. Where the existing meter and box are to be maintained, connect the new services with appropriate fittings to the existing meter.

I. Test for leaks and flush new piping to remove debris.

3.03 UNDERCROSSING OF HARD SURFACE ROADS

- A. Bore or jack undercrossings, except where new water mains and other work is being performed.
- B. PE service tubing shall be installed in a Schedule 40 PVC or SDR PE casing under all roadways to a distance of one foot beyond the edge of pavement.

3.04 COPPER TUBING

- A. Cut square ends, ream clean, flare, and makeup tightly.
- B. Prevent the tube from kinking or buckling on short radius bends. If tube should kink or buckle, cut out kinked or buckled sections and splice with brass fitting.

3.05 POLYETHYLENE PLASTIC PIPE

- A. Install in conformance with manufacturer's recommendations.

3.06 METER BOXES

A. Installation:

1. Construct enclosures plumb, and flush with existing ground surface unless shown otherwise.
2. Use standard extension sections to adjust to grade.
3. Meter boxes to be installed in sidewalk or 2-½ feet from the right-of-way line.
4. Place lightly compacted earth backfill inside meter box to depth shown.
5. Backfill around meter vaults as specified in Section 02320, Trench Backfill.
6. Install piping such that the meter can be installed in a horizontal position with dial at required depth below cover.
7. Meters will be installed by the OWNER.
8. Corporation Stops: OPEN position.
9. Angle Stops: CLOSED position.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.07 TESTING

- A. Inspect service connections for leakage under normal system pressure and in conjunction with the testing of new water mains. Joints shall be watertight before acceptance.
- B. Test Duration: As specified in Section 02500, Conveyance Piping - General.
- C. Inspect for leaks and repair before backfilling and final testing.

3.08 DISINFECTION OF SERVICE CONNECTIONS

- A. Disinfection of water service connections will be performed in conjunction with the disinfection of the water main in accordance with the provisions of Section 02519, Disinfection of Water Systems.
- B. Flush new tubing before connecting to existing tubing or meter stop, by opening corporation stop, allowing water to run for 2 minutes.
- C. Extra chlorine will be put into the system by Owner during service connection transfers to provide adequate disinfection capacity when above procedures are executed.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02533
MANHOLES****PART 1 GENERAL (NOT USED)****PART 2 PRODUCTS****2.01 PRECAST MANHOLES****A. Riser Sections:**

1. Minimum 48 inches in diameter.
2. Fabricate in accordance with ASTM C478.
3. Minimum Wall Thickness: 8 inches or 1/6 times inside diameter, whichever is greater.
4. Top and bottom shall be parallel.
5. Joints: Tongue-and-groove with confined gaskets meeting ASTM C443.
 - a. Preformed plastic gaskets shall be Ram-Nek, Henry Co. Houston, TX, or equal.
 - b. Preformed rubber gaskets shall be Rub'R Nek, Henry Co., Houston, TX; or equal.

B. Cone Sections:

1. Provide concentric cones.
2. Same wall thickness and reinforcement as riser section.
3. Top and bottom shall be parallel.

C. Base Sections and Base Slab:

1. Base Sections: Base slab integral with sidewalls.
2. Fabricate in accordance with ASTM C478.

D. Manhole Extensions:

1. Concrete grade rings
 - a. Maximum 6 inches high.
 - b. Mortared joints.
 - c. Fabricate in accordance with ASTM C478.
2. HDPE Grade Rings:
 - a. Material to comply with ASTM D1248.
 - b. Silicone sealant used for joints.
 - c. Suitable for H-20 loading.

E. Source Quality Control:

1. All test specimens shall be mat tested and meet the permeability test requirements of ASTM C14.
2. Conduct tests at point of manufacture prior to delivery of any section.

MANHOLES

CA02533-1
EXHIBIT 4
Page 257 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Sections to be tested will be selected at random from stockpiled material to be supplied for the Project.

2.02 CAST-IN-PLACE BASE SECTION AND SLABS

- A. Reinforcing Steel: Billet steel bars for concrete reinforcement shall conform to the requirements of ASTM A615, Grade 60.
- B. Concrete: Concrete shall be ready-mixed, conforming to ASTM C94/C94M, Alternate 2. Compressive field strength shall not be less than 4,000 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inch, slump shall be between 2 and 4 inches, field strength shall be assumed as equal to 85 percent of strength of laboratory-cured cylinders.
- C. Use for "dog-house" manholes or as required by special circumstances.

2.03 DROP MANHOLES

- A. Interior or exterior drop as shown on the Drawings. Interior drops for shallow drops and/or single drops only and only for existing manholes. All new drop manholes in excess of 24 inches shall be external drop.
- B. Drop manhole construction shall comply with the general requirements of all manholes.
- C. External drop manholes shall have the drop pad cast monolithically with the bottom slab and walls. If base and walls cannot be of monolithic construction, the bottom slab and drop pad shall be of monolithic construction.

2.04 MANHOLE FRAMES AND COVER

- A. Castings:
 1. Tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts, and defects.
 2. Cast Iron: ASTM A48 Class 30B.
 3. Plane or grind bearing surfaces to ensure flat, true surfaces.
 4. Frames and covers in roadway and traffic areas (7-inch frame) shall have a minimum total weight of 405 pounds. All other frames and covers (4-inch frame) shall have a minimum total weight of 355 pounds.
- B. Cover: True and seat within ring at all points with the city logo as shown on the Drawings.
- C. Covers shall have two concealed watertight pick holes. Covers shall not have boltholes or any other penetrations.
- D. Manufacturer: U.S. Foundry Company No. 420-GL for the 7-inch depth frame or U.S. Foundry Company No. 465-GL for the 4-inch depth frame, or approved equal.

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.05 ARV MANHOLE COVER

A. Castings:

1. Tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts, and defects.
2. Cast Iron: ASTM A48 Class 30B.
3. Plane or grind bearing surfaces to ensure flat, true surfaces.
4. Frames and covers in roadway and traffic areas (7-inch frame) shall have a minimum total weight of 405 pounds. All other frames and covers (4-inch frame) shall have a minimum total weight of 355 pounds.

B. Cover: True and seat within ring at all points with the City logo as shown on the Drawings.

C. Covers shall have two concealed watertight pick holes. Covers shall not have boltholes or any other penetrations.

D. Manufacturer: U.S. Foundry Company No. 690-AG-M; or equal, double lid manhole cover or approved equal. Inner lid shall be centered in the outer lid.

2.06 MANHOLE FRAME TO STRUCTURE SEALS

A. Banded Gasket Type (internal or external)

1. Materials

- a. Extrude or mold gasket from a high-grade rubber compound.
- b. Comply with materials test requirements of ASTM C923.
- c. Minimum Thickness: 3/16-inch.
- d. Minimum Unstretched Length: Sufficient to extend from the manhole frame, across a maximum of 12 inches of extension rings, to the manhole one section.
- e. Fabricate bands for compressing sleeve against manhole from Type 304 stainless steel:
 - 1) Channeled Sheet: Minimum 16-gauge, ASTM A167
 - 2) Round: 5/16-inch diameter, ASTM A240.
2. Screws, Bolts, or Nuts: Stainless steel conforming to ASTM F593 and ASTM 594, Type 304.
3. The internal gasket or its appurtenances shall not extend into the manhole opening to restrict entry into or exit from the manhole.
4. The gasket shall be made only of materials that have been proven to be resistant to the following exposures and conditions:
 - a. Sanitary sewage.
 - b. Corrosion or rotting under wet or dry conditions.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- c. Gaseous environment in sanitary sewers and at road surfaces including common levels of ozone, carbon monoxide, and other trace gases at the sites of installation.
 - d. Biological environment in soils and sanitary sewers.
 - e. Chemical attack by road salts, road oil, and common street spillages or solvents used in street construction or maintenance.
 - f. Temperature ranges, variations, and gradients in the area of construction.
 - g. Variations in moisture conditions and humidity.
 - h. Fatigue failure caused by a minimum of 30 freeze-thaw cycles per year.
 - i. Vibrations due to traffic loadings.
 - j. Fatigue failure due to repeated variations of tensile, compressive and shear stresses, and repeated elongation and compression.
 - k. Any combination of the above.
5. Materials used shall be compatible with each other and with the manhole materials.
6. Design Gasket to Meet the Following Requirements:
 - a. Continuously prevent leakage of water from outside the manhole into the manhole at the joints between the manhole frame and the cone section.
 - b. At the same time, seal shall remain flexible, allowing repeated vertical movements of the frame from 0 to 2 inches, or repeated horizontal movements of the frame with respect to the top of the extension or cone of from 0 to 1/2 inch due to pavement movements or other causes, or both types of movement occurring simultaneously at rates not exceeding 1/10 inch per minute.
7. Manufacturers:
 - a. Cretex chimney seal (internal and external).
 - b. NPC FlexRib Chimney Seal.
 - c. Infi-Shield by SSI
 - d. Or equal.
- B. Applied Internal Seal
 1. The seal shall cover the area from the frame to the corbel including all extensions and risers and shall overlap any applied internal coating.
 2. The seal shall consist of no less than 120 mils of elastomeric compound conforming to ASTM D-412 and having the following characteristics:

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Elongation 900% minimum
 - b. Applied elongation 325% minimum
 - c. Durometer Hardness 75 minimum
 - d. Tensile Strength = 3200 psi minimum
 - e. Adhesion = 350 pli minimum
 - f. The product shall be solvent and VOC free
3. Applicators must be certified by the seal manufacturer
 4. Manufacturers
 - a. ElastaSeal
 - b. Madewell 806
 - c. Flex-Seal by SSI
 - d. Or equal
- C. If an external chimney seal is not installed prior to backfill and paving, the CONTRACTOR shall be required to install internal seals at no additional cost.

2.07 MORTAR

- A. Not required for standard installations.
- B. Standard premixed in accordance with ASTM C387, or proportion 1 part Portland cement to 2 parts clean, well-graded sand that will pass a 1/8-inch screen.
- C. Admixtures: May be included but do not exceed the following percentages of weight of cement:
 1. Hydrated Lime: 10 percent.
 2. Diatomaceous Earth or Other Inert Material: 5 percent.
- D. Mix Consistency:
 1. Tongue-and-Groove Type Joint: Such that mortar will readily adhere to pipe.

2.08 EXTERIOR COATING AND JOINT SEALS

- A. All manholes shall be provided with external, coal tar epoxy, or approved equal. Minimum 16 mils dry film thickness, first coat shall be red and second coat shall be black.
 1. Coopers Creek #775 Epoxy Tar Coating
 2. Rustoleum C9578 Coal Tar Epoxy
 3. EpoxySystems #216 Coal Tar Epoxy Coating

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Simtar 200 Coal Tar Epoxy
 5. or equal
- B. All manholes section joints shall be covered with an external, water-tight, plastic or rubberized seal conforming to the structure shape.
1. As manufactured by Canusa Wrapid Seal, Houston TX.
 2. EZ-Wrap as manufactured by Press-Seal Gasket Corp., Ft. Wayne, IN.
 3. Cretex Wrap as manufactured by Cretex Specialty Products, Waukesha, WI.
 4. Gator-Wrap by SSI
 5. Or equal.

2.09 IMPORTED PIPE BASE

- A. Furnish as specified in Section 02320, Trench Backfill.

2.10 FLEXIBLE PIPE JOINTS

- A. Manufacturers:
1. "Kor-N-Seal" flexible rubber boot with stainless steel accessories as manufactured by NPC, Inc., Milford, New Hampshire.
 2. "Z-LOK XP" or "A-LOK" flexible connectors as manufactured by A-LOK Products, Inc., Tullytown, PA.
 3. Lockjoint Flexible Manhole Sleeve as manufactured by Chardon Rubber Company, Chardon, OH.

2.11 MANHOLE LINING AND REHABILITATION

- A. Mainstay DS-5 Epoxy Coating, as specified and manufactured by Madewell Products Corp., Roswell, GA.
- B. SewperCoat Calcium Aluminate Mortar as specified and manufactured by Kerneos Aluminate Technologies, Chesapeake, VA.
- C. Strong-Seal HPM Calcium Aluminate Mortar as specified and manufactured by The Strong Co., Pine Bluff, AK.
- D. I.E.T Systems Polymorphic Resin Systems 1 and 3 as specified and manufactured by Integrated Environmental Technologies of Santa Barbara, CA.

2.12 REPAIR MATERIALS

- A. Nonshrink Grout: Grout shall be nonmetallic. The grout shall be nongas-liberating type, cement-base, premixed product requiring only the addition of water for the required consistency. All components shall be inorganic. The following listed grouts meet these requirements and are acceptable for use:
1. Horngrout, TAMMS Industries, Mentor, OH.
 2. UPCON Super Flow, The UPKO Company, Cleveland, OH.
 3. Set Grout, The Master Builders Co., Cleveland, OH.

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Crystex, L&M Construction Chemicals, Inc., Omaha, NE.
- B. Patching Mortar: Shall be as approved by waterproofing/structural repair materials manufacturer as listed in Paragraph Waterproofing/Structural Repair Material.
- C. Waterproofing/Structural Repair Material: Materials shall be compatible with the selected lining system as confirmed by the manufacturer. The following listed waterproofing/structural repair materials are acceptable for use:
 1. EMACO 588-CA, Master Builders, Inc., Cleveland, OH.
 2. QUADEX QM-1s RESTORE, QUADEX Sewer Rehabilitation Products of Maumelle, AR.
 3. Mainstay ML-72, Parson Environmental Products, Inc., Reading, PA.
 4. SewperCoat Calcium Aluminate Mortar as specified and manufactured by LaFarge Aluminates, Chesapeake, VA.
 5. Strong-Seal HPM Calcium Aluminate Mortar as specified and manufactured by The Strong Co., Pine Bluff, AK
- D. Concrete: Conform to the requirements of Section 03301, Reinforced Concrete.
- E. Mortar: Mortar shall be sand/portland cement mix conforming to ASTM C270.
- F. Pipe Plugs: Pipe plugs shall be rubber gasketed test plugs, sized as necessary.
- G. Backfill: Conform to the requirements of Section 02320, Trench Backfill.

PART 3 EXECUTION**3.01 GENERAL**

- A. Remove and keep all water clear from the excavation during construction and testing operations.
- B. Place imported pipe base material on undisturbed earth; thoroughly compact with a mechanical vibrating or power tamper.
- C. No traffic or live loads shall be allowed to be placed on all precast manholes for at least 1 day after installation.

3.02 EXCAVATION AND BACKFILL

- A. Excavation: As specified in Section 02316, Excavation.
- B. Backfill: As specified in Section 02320, Trench Backfill.
- C. Manholes coated with coal tar epoxy coating shall dry a minimum of 6 hours before backfilling.

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.03 INSTALLATION OF PRECAST MANHOLES

A. Concrete Base:

1. Cast-In-Place:

- a. Vibrate to densify concrete and screed so first precast manhole section to be placed has a level, uniform bearing for full circumference.
- b. Deposit sufficient mortar on base to assure watertight seal between base and manhole wall, or place first precast section of manhole in concrete base before concrete has set. Properly locate and plumb first section.

2. Precast:

- a. Place on 6-inch minimum compacted imported base material.
- b. Properly locate, ensure firm bearing throughout, and plumb first section.

B. Sections:

1. Thoroughly clean ends of sections to be joined.
2. Thoroughly wet joint with water prior to placing mortar.

C. Mortar Joints:

1. As required by specific circumstances only. Preferred joint is gasket and external seal as specified.
2. Place mortar on groove of lower section prior to section installation.
3. Fill joint completely with mortar of proper consistency.
4. Trowel interior and exterior surfaces smooth on standard tongue-and-groove joints.
5. Prevent mortar from drying out and cure by applying an approved curing compound or comparable approved method.
6. Do not use mortar mixed for longer than 30 minutes.
7. Chip out and replace cracked or defective mortar.
8. Wrap and seal all manholes joints in accordance with manufacturer's instructions.
9. Completed Manholes: Rigid and watertight.

D. Interior and Exterior Coating:

1. All sanitary sewer manholes shall receive 2 coats (minimum 7 mils per coat) of coal tar epoxy to the base slab, interior and exterior walls.
2. Manholes shall be painted at least 24 hours prior to installation. Repair all slabs to coating once manhole is constructed.
3. When proper coating and thickness is applied, a definite sheen is present. If the coating does not have a sheen, additional coating will be applied until the sheet is obtained.

E. Extensions:

1. Provide on manholes in streets or other locations where a subsequent change in existing grade may be likely.
2. Install to height not exceeding 12 inches.

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Grade rings to be precast concrete or HDPE.
4. Lay concrete grade rings in mortar with sides plumb and tops level.
5. Seal joints with external joint wrap as specified for sections, and make watertight.

3.04 MANHOLE INVERT

- A. Construct with smooth transitions to ensure an unobstructed flow through manhole. Remove sharp edges or rough sections that tend to obstruct flow.
- B. Where full section of pipe is laid through manhole, break out top section as shown and cover exposed edge of pipe completely with mortar. Trowel mortar surfaces smooth.
- C. The channel height shall match the crown of the connecting pipes.

3.05 MANHOLE FRAMES AND COVERS

- A. Set frames in bed of mortar with mortar carried over flange as shown.
- B. Set tops of covers flush with surface of adjoining pavement or 3 inches higher than the surrounding unsurfaced ground surface, unless otherwise shown or directed.
- C. At all locations, unless otherwise provided on the Drawings, install exterior manhole frame to structure seals in accordance with manufacturer's instructions.

3.06 ADJUSTING EXISTING MANHOLES

- A. Cut down or extend existing manholes within the limits of the proposed work, to meet the finished grade of the proposed pavement, or if outside of the proposed pavement area, to the finished grade designated on the Drawings for such structures.
- B. Use materials and construction methods which meet the requirements specified to cut down or extend the existing structures.
- C. The Contractor may extend manholes needing to be raised using adjustable extension rings of the type which do not require the removal of the existing manhole frame. Use an extension device that provides positive locking action and permits adjustment in height as well as diameter and meets the approval of the Engineer.

3.07 MANHOLE PIPING

- A. Drop Assembly:
 1. Extend pipe from the drop to a minimum of 3 feet beyond the manhole excavation into the trench, and connect to sewer pipe with an adapter.
 2. Support lower drop elbow with concrete monolithically-placed with manhole base.

MANHOLES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Flexible Joints:

1. Provide in all pipe not more than 1-1/2 feet from manhole walls.
2. Where last joint of pipe is between 1-1/2 and 6 feet from manhole wall, provide a flexible joint in the manhole wall.

C. Stubouts for Future Connections:

1. Provide same type and class of pipe as specified for use in service connection, lateral, main, or trunk sewer construction. Where there are two different classes of pipe at manhole, use higher strength pipe.
2. Grout pipe in precast walls or manhole base to provide watertight seal or use flexible joints as specified herein.
3. Maximum Length: 1-1/2 feet outside manhole wall.
4. Construct invert channels as shown. Unless otherwise approved by Engineer, match inside top elevation of service connection pipe to inside top elevation of outlet pipe.
5. Test Plugs:
 - a. Install rubber-gasketed plugs in end of stubouts with gasket joints similar to sewer pipe being used.
 - b. Plugs shall withstand internal or external pressures without leakage.
 - c. Adequately brace plugs against all hydrostatic or air test pressures.

D. Permanent Plugs:

1. Clean interior contact surfaces of pipes to be cut off or abandoned as shown, and construct plug as follows:
 - a. Pipe 18 Inches or Less in Diameter: Concrete plug in end, minimum 8 inches in length.
 - b. Pipe 21 Inches and Larger:
 - 1) Construct plugs of common brick, concrete block, or concrete.
 - 2) Plaster exposed face of block or brick plugs with mortar.
 - c. Plugs shall be watertight and capable of withstanding internal and external pressures without leakage.

3.08 MANHOLES OVER EXISTING PIPING

A. Maintain flow through existing pipelines at all times.

B. Plastic Pipe:

1. Use solvent recommended by pipe manufacturer to slightly soften the pipe wall.
2. Apply a dense coating of clean mortar sand over all areas that will be in contact with concrete.
3. Allow mortar to dry completely prior to placing concrete.

C. Concrete Pipe: Apply a bonding agent on all surfaces to be in contact with concrete.

MANHOLES

01513120
0253340
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Construct base under existing piping.
- E. Construct manhole as specified.
- F. Break out existing pipe within new manhole, cover edges with mortar, and trowel smooth.
- G. Protect new concrete and mortar work for 7 days after placing concrete.

3.09 CONNECTIONS TO EXISTING MANHOLES

- A. Core drill hole in existing manhole bases or grouting as necessary.
- B. Clean all surfaces and apply a bonding agent.
- C. Install appropriate pipe to manhole adapter.
- D. Regrout to provide smooth flow into and through manholes.
- E. Provide diversion facilities and perform work necessary to maintain flow during connection.

3.10 MANHOLE REHABILITATION

- A. Specific manhole repairs required are shown on the Drawings.
- B. Cleaning: All structures scheduled for rehabilitation shall be cleaned and scarified with a minimum 2,000 psi water jet at a minimum water temperature of 140 degrees F, or a 3,000 psi water jet at a minimum water temperature of 60 degrees F. The water jet shall hit the wall surface at as near a perpendicular angle as possible. Cleaning the walls from the surface without appropriate angled nozzles will not be accepted. All surface buildup and contamination and all loose mortar shall be removed during the cleaning process. If required, detergent and/or muriatic acid shall be used to remove grease, oil, and other matter that would prevent a good adhesive. Specific manufacturer's recommendations may require additional cleaning measures. Before cleaning, the Contractor shall install wire mesh screening over the inlet and outlet pipes to prevent materials from entering the sewer system. Remove all debris from the bottom of the structure and bear all costs for proper disposal.
- C. Structurally Repair Entire Structure: Clean walls in accordance with Paragraph on Cleaning. Plug any leaks in accordance with the manufacturer's recommendation. If heavy leaks flow after Item C is complete, install bleedlines, as necessary at the bottom of the manhole to reduce the hydrostatic pressure. After pressure is reduced, plug remaining leaks with approved patching mortar as discussed in subparagraph Patching Mortar. Next, plug bleedlines with approved patching mortar and continue waterproofing process. Fill all cracks, holes, and joints that have voids with approved material as listed in Subparagraph Waterproofing/Structural Repair Material in accordance with the manufacturer's recommendations. Apply waterproofing/structural repair material per manufacturer's recommendations.

MANHOLES

02531241
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Plug Abandoned Line: Plug abandoned sewer pipes if not shown with concrete plug prior to placement of lining.

3.11 FIELD QUALITY CONTROL

- A. All installed manholes are to be inspected and approved prior to backfilling or Contractor may be required to excavate the manhole at no additional cost.
- B. Hydrostatic Testing:
 - 1. When, in Engineer's opinion, the groundwater table is too low to permit visual detection of infiltration leaks, hydrostatically test all project manholes.
 - 2. Procedure: Plug inlets and outlets and fill manhole with water to height determined by Engineer.
 - 3. A manhole may be filled 24 hours prior to time of testing, if desired, to permit normal absorption into the pipe walls to take place.
 - 4. Leakage in each manhole shall not exceed 0.1 gallon per hour per foot of head above the invert.
 - 5. Repair manholes that do not meet the leakage test, or do not meet specified requirements from visual inspection.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02575
SURFACE RESTORATION****PART 1 GENERAL****1.01 STANDARD SPECIFICATIONS**

- A. When referenced in this Section, shall mean Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition.

1.02 INTENT

- A. Specific surface restoration requirements are detailed in this and other sections.
- B. For pipeline projects, the intent of these Specifications and the criteria of Section 01025, Measurement and Payment, is that the roadway, adjacent right-of-way, and properties affected by construction activity shall be returned to their pre-existing condition, unless otherwise indicated by these Contract Documents.
1. For pipelines constructed in the right-of-way between the sidewalk and edge of pavement, the ground surface will be graded into a swale as shown on the Drawings and provided with sod.
 - a. Argentine Bahia sod will be used for areas without irrigation systems, except where St. Augustine turf existed previously.
 - b. St. Augustine "Floritam" sod will be used for areas with irrigation systems and in locations with similar, existing turf.
 2. Driveways and sidewalks will be placed in kind, using similar materials of construction.
 3. Trees, shrubs, and personal property (e.g. mail boxes) located in the swale area shall be relocated or replaced in kind, in accordance with the provisions of these Specifications.
- C. For work areas disturbed by the Contractor for convenience, the area affected shall be restored in kind.
1. The costs of this restoration shall be incidental to the cost of the Work.
 2. Payment for restoration outside the limits of work shall be repaired at the Contractor's expense.

1.03 WORK INCLUDED

- A. This Section covers the Work necessary to replace all pavement, curbs, sidewalks, rock surfacing, and other street features damaged either directly or indirectly by the operations incidental to the construction described in other sections of these Specifications.
- B. Where the materials, construction procedures, degree of compaction of materials, and the method of control and testing, as required in these

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Specifications differ from the Standard Specifications requirements, the more stringent requirements shall apply.

- C. The intent of the Drawings is to provide a full lane, permanent trench repair for all work crossing or running parallel with roadways. Temporary restoration to provide a passable surface is also required.
- D. Overlay of asphalt pavement may be required as shown on the Drawings.
- E. Provide finished gradation and grassing in accordance with Section 02920, Sodding.

1.04 OPTIMUM MOISTURE CONTENT

- A. "Optimum moisture content" shall be determined by the ASTM standard specified to determine the maximum dry density for relative compaction.

1.05 TEMPORARY TRENCH REPAIR OR STABILIZATION

- A. Following pipe installation and prior to permanent trench repair or asphalt replacement, temporary trench repair will be defined as one of the following:
 - 1. Installation of flowable fill as described in this Section and Section 02772, Asphalt Concrete Pavement.
 - 2. Installation of the compacted base course and an asphalt prime coat as described in this Section and Section 02772, Asphalt Concrete Pavement.
- B. Temporary trench repair shall be maintained in accordance with the requirements of this Section and Section 02772, Asphalt Concrete Pavement, until the final trench repair or asphalt surface is installed to provide a dust-free, drivable, and safe roadway surface.

PART 2 PRODUCTS**2.01 GENERAL**

- A. All materials for replacement of existing base course and asphalt surfacing shall conform to the Standard Specifications except as modified herein.
- B. The Contractor will be responsible for furnishing satisfactory materials that meet the Specifications and shall provide such tests during the course of the Work as are necessary to assure that the quality of the material used meets the Specifications.

2.02 LIME ROCK BASE COURSE

- A. Aggregate quality and gradation shall meet the requirements of Section 911 of the Standard Specifications.

2.03 BITUMINOUS PRIME AND TACK COAT**SURFACE RESTORATION**

CA 02571329
02571329
EXHIBIT 4

Page 270 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. Prime Coat: Material shall be cutback asphalt, Grade RC-70 or RC-250 meeting the requirements of Section 916-2 of the Standard Specifications, or approved equal.
- B. Tack Coat: Material shall be emulsified asphalt, Grade RS-2, SS-1, or SS-1H meeting the requirements of Section 916-4 of the Standard Specifications.
- C. Tack coats used for temporary trench stabilization shall be sanded to prevent damage to vehicles.

2.04 ASPHALT CONCRETE

- A. The asphalt concrete for trench leveling, restoration and overlay shall be Type S-III, meeting the requirements of Section 331 of the Standard Specifications and Section 02772, Asphalt Concrete Pavement.
- B. Aggregate: The aggregate shall meet the requirements of Section 331 of the Standard Specifications.
- C. Submit test results from commercial testing laboratories to the Engineer to show that the materials meet the quality and gradation requirements.

2.05 FLOWABLE FILL

- A. Provide flowable fill with a mix design meeting the requirements of Section 121 of the (FDOT) Standard Specifications for excavatable, flowable fill. Flowable fill may be allowed as a substitute for compacted base upon approval of the Engineer, at no additional cost.

2.06 CONCRETE

- A. Concrete shall be 3,000 psi minimum concrete meeting the requirements of Section 345 of the Standard Specifications.
- B. Concrete Forms: All forms for curbs and sidewalks shall be either 2-inch dimensioned lumber, plywood, or metal forms. Forms on the face of the curb shall have no horizontal form joints within 7 inches of the top of the curb.
- C. Curing Compound: Meeting the requirements of Section 925 of the Standard Specifications.
- D. Reinforcing Steel: Conform to ASTM A615, Grade 60.

2.07 TRAFFIC MARKINGS

- A. All traffic striping markings (i.e., lane, edge of pavement, directional, informational, etc.) damaged by the Contractor during construction shall be replaced with new painted items in meeting the requirements of Section 971 of the Standard Specifications.

SURFACE RESTORATION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Raised reflective pavement markers (rpm's) damaged by the Contractor during construction shall be replaced with new rpm's meeting the requirements of Section 706 of the Standard Specifications.
- C. The Contractor shall place and maintain temporary striping markings throughout the course of the work until the permanent striping marking is placed on the final roadway surface.
- D. The Contractor shall provide painted traffic stripping at all intersections including stop bars and crosswalks as required whether they are currently stripped or not. It shall be the Contractor's responsibility to take a complete inventory and provide the appropriate permanent stripping after the completion of the Work.

2.08 SWALE STABILIZATION

- A. Materials used for stabilization of swale areas as indicated on the Drawings shall consist of suitable excess existing base material removed from trenching operations, if approved by the Engineer, crushed limerock, rock screenings, or other suitable material as approved by the Engineer.
 - 1. Materials having a plasticity index of more than 10, or a liquid limit greater than 40 shall not be used.
 - 2. Maximum dimension shall not exceed 1.5 inches.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURE

- A. The Engineer reserves the right to vary the type of resurfacing as best serves the interest of the Owner. Trench backfill shall be as specified in Section 02320, Trench Backfill.
- B. Replace all bituminous and concrete roadway pavement damaged or removed under this Contract with asphalt concrete regardless of original type. Pavement thickness shall be in accordance with the Drawings.
- C. In addition to the requirements set forth herein, the work shall conform to the applicable workmanship requirements of the state and county highway or municipal specifications.
- D. Water to control dust shall be used as directed by the Engineer until the trench repair has been stabilized. If control of dust is inadequate by these means, the Engineer may direct the immediate application of a prime or tack coat in accordance with the provisions of this Section, at no additional cost to the Owner. The Engineer reserves the right to delay additional excavation activities until dust control measures are adequate.
- E. Base course and prime coat shall be installed to provide temporary trench stabilization within 5 working days of trench backfill or as soon thereafter as the as-built conditions and pipe slopes have been verified.

SURFACE RESTORATION

CA 02571324
EXHIBIT 4

Page 272 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- F. Final, permanent trench repair, and paving shall be installed within 3 weeks of pipe verification and temporary trench stabilization, unless flowable fill is used for temporary trench repair, in accordance with the provisions of this Section.

3.02 REMOVAL OF PAVEMENT, SIDEWALK, CURBS, AND GUTTERS

- A. Removal of all pavement, sidewalks, curbs, and gutters shall conform to Section 02220, Demolition, and payment for removal shall be included in that Section. Payment for removal is incidental to the cost of pipe installation except where required for water and sewer service installation.

3.03 CUTTING EXISTING PAVEMENT

- A. Where new pavement abuts existing pavement, the old pavement shall be trimmed by saw cutting to a straight line. Any pavement which has been damaged or which is broken and unsound shall be removed to provide a smooth, sound edge for joining new pavement.

3.04 STREET MAINTENANCE

- A. Maintain all trenches as specified in this section and under Section 02320, Trench Backfill.

3.05 CONSTRUCTION OF BASE COURSE

- A. Base course shall be constructed in accordance with Section 200 of the Standard Specifications.
- B. Compact base materials to a minimum of 98 percent of the maximum density as determined by AASHTO T180. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer. Where the base is constructed in more than one course, the density shall be obtained in each lift.
- C. Alternately, and with the approval of the Engineer, the Contractor shall provide a minimum 10 inches of excavatable, flowable fill. The flowable fill shall be placed up to 1 ½ inches from the top of the existing pavement or to the fill line without vibration or compaction. Flowable fill shall not be placed during periods of inclement weather and rainfall. Provide a means to confine the material within the designated space. Flowable fill installed in accordance with this provision shall comply with temporary pavement restoration provisions.

3.06 MILLING OR GRINDING OF EXISTING ASPHALT PAVEMENT

- A. Milling of existing asphalt pavement shall meet the requirements of Section 327 of the Standard Specifications.
- B. Milling shall be used to lower the grade of adjacent existing asphalt prior to trench repair to completely remove existing asphalt.

SURFACE RESTORATION

CA 02571324
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Milled and ground asphalt can be mixed for use with the limerock base course material.

3.07 BITUMINOUS PRIME AND TACK COAT

- A. The bituminous prime coat shall be applied to the lime rock base immediately following the placement of the compacted base course. The prime coat shall be maintained with additional coats as determined by the Engineer as temporary restoration until the final asphalt surface is installed. Additional prime coats will be provided at no cost to the Owner.
- B. The lime rock base shall be hard planed with a blade grader immediately prior to the application of the prime coat.
- C. The rate of application of the bituminous prime coat shall meet the requirements of Section 916-2 of the Standard Specifications.
- D. The bituminous tack coat shall be applied to existing asphalt surfaces prior to the placement of new asphalt, between layers of asphalt concrete surface courses, surfaces of concrete footings that will come in contact with the asphalt concrete pavement, and vertical faces of all longitudinal and transverse joints that have become compacted or cooled.
- E. The rate of application for the bituminous tack coat shall meet the requirements of Section 916-4 of the Standard Specifications.

3.08 ASPHALT CONCRETE PAVEMENT REPLACEMENT

- A. Preparation for Paving:
 - 1. A prime coat shall be applied over the full length of the roadway, and asphalt concrete pavement shall not be placed until the prime coat has cured as per the manufacturer's recommendations.
 - 2. Should any holes, breaks, or irregularities develop in the roadway surface after the prime coat has been applied, they shall be patched with asphalt concrete immediately in advance of placing the asphalt concrete.
 - 3. After the maintenance, patching, or repair work has been completed and immediately prior to placing the asphalt concrete pavement, the surface of the prime coat shall be swept clean of all dirt, dust, or other foreign matter.
- B. The proposed pavement reconstruction schedule consists of immediately paving over trenches as soon as possible after it has been determined that subbase and base have achieved required compactions. The base course will be brought up to the elevations indicated on the Drawings and asphalt placed to bring grade up to match existing pavement elevations as shown on the Drawings.
- C. For deep excavations where the pavement repair constitutes a full lane or roadway, workmanship shall conform to the standards and details of new road way construction.

SURFACE RESTORATION

CA 02571326
EXHIBIT 4

Page 274 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Existing pavement more than 2 feet wide beyond the trench area shall be left in place and a full overlay applied to the limits of the existing road width.
2. Existing base beyond the trench area shall be left in place.
3. Full lane or width roadways shall have a consistent cross-section and straight edge of pavement delineation's.

3.09 CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT OVERLAY – IF REQUIRED

- A. The Contractor shall place a layer of tack coat at a rate of 0.05 to 0.12 gallon per square yard over all areas to receive asphalt concrete.
- B. Lay asphalt concrete over all areas designated to be resurfaced. The asphalt concrete pavement overlay shall be placed in two ¾-inch lifts to a compacted depth of 1-1/2 inches or as shown on the Drawings. The method of proportioning, mixing, transporting, laying, processing, rolling the material, and the standards of workmanship shall meet the applicable requirements of Sections 320, 330, and 331 of the Standard Specifications. At no time shall the coarse aggregate segregated from the mix either from hand spreading or raking of joints be scattered across the paved mat. Such material shall be collected and disposed of.
- C. The Engineer will examine the prepared roadway before the paving is begun and bring any deficiencies to the Contractor's attention to be corrected before the paving is started. Roll each lift of the asphalt concrete until roller marks are eliminated and compacted to 100 percent of the laboratory compacted mixture. The grade, line, and cross section of the finished surface shall conform to the Drawings. Asphalt or asphalt stains which are noticeable upon surfaces of concrete or materials which will be exposed to view shall be promptly and completely removed.

3.10 ASPHALT CONCRETE PAVEMENT

- A. Workmanship in producing, hauling, placing, compacting, and finishing asphalt concrete shall meet the applicable portions of the Standard Specifications.

3.11 CONNECTIONS WITH EXISTING FACILITIES

- A. Where the bituminous pavement is to be connected with an existing roadway surface or other facility, the Contractor will be required to modify the existing roadway profile in such a manner as to produce a smooth riding connection to the existing facility. The Contractor shall meet existing neat lines where required.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Where it is necessary to remove existing asphalt surfaces or oil mat surfaces to provide proper meet lines and riding surfaces, the Contractor shall sawcut the existing surface so that there will be sufficient depth to provide a minimum of 1 inch of asphalt concrete, and the waste material shall be disposed of to the satisfaction of the Engineer. Prior to placing the asphalt concrete, these areas shall be tacked. Meet lines shall be straight and the edges vertical. The edges of meet line cuts shall be painted with liquid asphalt or emulsified asphalt prior to placing asphalt concrete. After placing the asphalt concrete, the meet line shall be sealed by painting with a liquid asphalt or emulsified asphalt and immediately covered with clean, dry sand.

3.12 CONSTRUCTION OF COURSES

- A. The asphalt concrete pavement shall be constructed in one or more courses as shown on the Drawings.
1. Rolling shall continue until all roller marks are eliminated and compacted to 100 percent of the laboratory compacted mixture has been obtained.

3.13 SURFACE TOLERANCE

- A. Tests for conformity with the specified grade shall be made by the Contractor immediately after initial compression. Any variation shall be immediately corrected by the removal or addition of materials and by continuous rolling.
- B. The completed surface of the pavement shall be of uniform texture, smooth, uniform as to grade, and free from defects of all kinds. The completed surface shall not vary more than 1/8 inch from the lower edge of a 12-foot straightedge placed on the surface along the centerline or across the trench.
- C. After completion of the final rolling, the smoothness and grade of the surface shall again be tested by the Contractor.
- D. When deviations in excess of the above tolerances are found, the pavement surface shall be corrected as stated in Section 330-12.4 of the Standard Specifications.
- E. All areas in which the surface of the completed pavement deviates more than twice the allowable tolerances described above shall be removed and replaced to the satisfaction of the Engineer.
- F. All costs involved in making the corrections of defects described above shall be borne by the Contractor and no compensation will be made for this Work.

3.14 SAMPLES

- A. If directed by the Engineer, the Contractor shall without additional charge, provide the Engineer with test results of samples of asphalt concrete cut from the completed pavement or the individual courses thereof for each occurrence. Provide a minimum of three test cores located as directed by the Engineer. He shall also provide the Engineer with test results of samples of

SURFACE RESTORATION

CA 02571328
EXHIBIT 4

Page 276 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

the uncompressed asphalt concrete mixtures and all materials incorporated in the Work.

3.15 WEATHER CONDITIONS

- A. Asphalt shall not be applied to wet material. Asphalt shall not be applied during rainfall or any imminent storms that might adversely affect the construction. The Engineer will determine when surfaces and materials are dry enough to proceed with construction. Asphalt concrete shall not be placed during heavy rainfall or when the surface upon which it is to be placed is wet.

3.16 PROTECTION OF STRUCTURES AND ADJUSTMENT OF APPURTENANCES

- A. Provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other structures from splashing oil and asphalt from the paving operations. Remove any oil, asphalt, dirt, or any other undesirable matter that may come upon these structures by reason of the paving operations.
- B. Where water valve boxes, manholes, catch basins, or other underground utility appurtenances are within the area to be surfaced, the Contractor shall adjust the tops of these facilities to conform with the proposed surface elevations. The Contractor shall notify the proper authority and either raise or lower the appurtenances or make arrangements with that authority for having the facilities altered at the Contractor's expense before proceeding with the resurfacing. The Contractor will be responsible for making certain that appurtenances are brought to proper grade to conform with finished surface elevations and any delays experienced from such obstructions will be considered as incidental to the paving operation. No additional payment will be made. Protect all covers during asphalt application. All adjustments shall be made in accordance with the requirements of the respective utility.
- C. To extend manhole use grade rings as specified, do not use leveling rings. Remove the frame and cover, rebuild the manhole top to raise it so that the new height meets the overlay elevations and then replace the frame and cover in accordance with Section 02533, Manholes, and the Drawings.

3.17 EXCESS MATERIALS

- A. Dispose of all excess materials. Make arrangements for the disposal and bear all costs or retain any profit incidental to such disposal.

3.18 CONTRACTOR'S RESPONSIBILITY

- A. Settlement of replaced pavement over trenches within the warranty period shall be considered the result of improper or inadequate compaction of the subbase or base materials. The Contractor shall promptly repair all pavement deficiencies noted during the warranty period at the Contractor's sole expense.

SURFACE RESTORATION

CA 02571329
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.19 SIDEWALKS AND CURBS

- A. Replace concrete sidewalks and curbs to the same section width, depth, line, and grade as that removed or damaged or as shown on the Drawings. The minimum thickness of sidewalks shall be 4 inches and 6 inches in driveways. Cut ends of existing curb to a vertical plane. Prior to replacing the sections, properly backfill and compact the trench to prevent subsequent settlement.
- B. Replace concrete sidewalks at scored joints and make replacement in a manner that will avoid a patched appearance. Provide a minimum 2-inch thick compacted leveling course of clean sand or gravel of quality hereinbefore specified. Finish concrete surface similar to the adjacent sidewalks.

3.20 DRIVEWAYS AND WALKS

- A. Replace asphalt driveways and walks in accordance with Paragraph Asphalt Concrete Pavement Replacement.
- B. Replace concrete and paver driveways in kind, using similar materials of construction. Concrete driveways shall consist of a reinforced, 6-inch section installed in accordance with Section 02771, Concrete Curbs and Sidewalks.

3.21 PAINTING TRAFFIC STRIPES

- A. All areas having traffic stripes prior to paving shall be repainted. Temporary traffic painting shall be applied immediately after asphalt pavement has been placed. Permanent traffic painting may be applied only after the proper curing time for the asphalt. Painting traffic stripes (temporary and permanent) shall meet the requirements of Section 710 of the Standard Specifications.

3.22 INSTALLATION OF RAISED REFLECTIVE PAVEMENT MARKERS

- A. All areas having raised reflective pavement markers prior to paving shall have those markers replaced. Temporary pavement markers shall be applied immediately after asphalt pavement has been placed. Permanent pavement markers may be applied only after the proper curing time for the asphalt. Pavement markers and adhesive (temporary and permanent) shall meet the requirements of Section 706 of the Standard Specifications.
- B. Spacing: As shown in the Roadway and Traffic Design Standards for Design, Construction, Maintenance and Utility operations on the State Highway System by the State of Florida, Department of Transportation, current edition.

3.23 PAVEMENT REPAIR

- A. All damage to pavement as a result of work under this Contract shall be repaired in a manner satisfactory to the Engineer and at no additional cost to the Owner. The repair shall include preparation of the subgrade, placing and compaction of the lime rock base and placement of the final asphalt surface as described in this Section.

SURFACE RESTORATION

02575-140
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage with the edge of pavement left saw cut to a true edge with no irregularities. For county roads and city streets recently constructed or overlaid, the repair may be required to be full-lane width as shown on the Drawings.

3.24 SWALE RESTORATION

- A. New or existing swale areas (areas between pavement edge and sidewalks, or right-of-way line if there is no existing or proposed sidewalk) shall be graded and reshaped to the cross section shown on the Drawings. Where storm inlets are present, the swale shall have a consistent longitudinal slope towards the inlet.
- B. Swale areas with previously existing improved surfaces, including but not limited to asphalt, concrete, pavers, crushed or decorative rock, shall be restored in kind. Asphalt paved areas shall be constructed with a minimum 6-inch stabilized subbase and minimum 6-inch compacted limerock base, primed and topped with minimum 1-inch asphalt.
- C. Swale areas with previously unimproved or turfed surfaces will be restored with soil stabilization where existing natural soil will not support vehicle loads normally imposed by movement and parking of heavy vehicles without rutting and shifting of soil. Subject to the approval of the Engineer, this work may be performed in connection with preparation of subgrade or construction of the limerock base course.
- D. Swale areas with previously unimproved or turfed surfaces will be topped with sod. St. Augustine "Floritam" and two inches of topsoil shall be used in irrigated areas and where St. Augustine sod was previously established. Bahia sod shall be placed in all other areas not previously improved or sodded.

3.25 SWALE STABILIZATION

- A. Where swale stabilization is required as indicated above, stabilization shall be achieved by the addition and mixing in of suitable stabilizing materials. It shall be incorporated into the existing swale soils by plowing, disking, harrowing, blading or mixing with rotary tillers or other appropriate equipment approved by the Engineer, until the mixed materials are of uniform bearing value throughout the width and at least 6-inch depth from the top of the swale after the swale is graded and shaped to the section indicated on the plans.
- B. The swale areas shall be mixed and compacted to achieve a minimum average dry density of 90 percent throughout the 6-inch thickness, as determined by AASHTO T180. In the determination of such average, the minimum acceptable density shall be 85 percent and the maximum density which shall be used in calculations shall be 100 percent (if the tested density is reported above 100 percent).
- C. Density tests for swale stabilization shall be made at intervals not less than one set of three per City block on each side of the roadway, or at increased

SURFACE RESTORATION

00575124
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

intervals as directed by the Engineer when required to measure small or isolated sections (except where such testing may be considered unnecessary by the Engineer). Each set of three shall be averaged as indicated above for determination of meeting the minimum requirements.

3.26 SPECIAL SWALE REPAIR

- A. Certain swale areas (designated on Drawings) have longitudinal trench filled with ballast rock for drainage. If appropriate, a separate pay item applies for removal and reconstruction of ballast rock drainage damaged during installation of pipelines. All other aspects of restoration work in the swale will be paid for separately under the restoration item. Swale stabilization will not be required in those areas with ballast rock drainage.

3.27 BRICK OR PAVER RESTORATION

- A. Remove and salvage bricks or paver materials to be disturbed by the work. Payment will be made in accordance with the unit price for these items.
- B. Restore pavers and apron area shall be constructed as shown in the Drawings. Payment will be made in accordance with the unit price for these items.
- C. Paver and apron areas shall be constructed as shown in the Drawings.
- D. If brick and paver materials are damaged, new materials shall match or all materials within the crossing must be replaced at no additional cost. New materials shall be approved by the Owner.

END OF SECTION

PROJECT 11880

SECTION 02632
STORM DRAIN AND SANITARY SEWER PIPING

PART 1 GENERAL**1.1 DELIVERY, STORAGE, AND HANDLING**

- A. The storage of pipe at the Project site shall be done in accordance with pipe manufacturer's recommendations and with the approval of the ENGINEER.
- B. Marking at Plant: Mark each pipe and fitting at plant. Include date of manufacture, manufacturer's identification, specification standard, diameter of pipe, pipe class, and other information required for type of pipe
- C. Pipe, specials, and fittings received at Project site in damaged condition will not be accepted.
- D. Pipe and fittings shall not be stored on rocks or gravel, or other hard material that might damage pipe. This includes storage area and along pipe trench.
- E. Gasket Storage: Store rubber gaskets in cool, well-ventilated place and do not expose to direct rays of sun. Do not allow contact with oils, fuels, petroleum, or solvents.
- F. Handling:
 - 1. Pipe shall be protected during handling against impact, shock, and falling.
 - 2. Heavy canvas, or nylon slings of suitable strength shall be used for lifting and supporting materials. Do not use chains or cables.
 - 3. Lifting pipe during unloading or lifting into trench shall be done using two slings placed at quarter point of pipe section. Pipe may be lifted using one sling near center of pipe, provided pipe is guided to prevent uncontrolled swinging and no damage will result to pipe or harm to workmen. Slings shall bear uniformly against pipe.

PART 2 PRODUCTS**4.1 PIPE AND FITTINGS**

- A. As specified on the Data Sheets located at the end of this Section as a supplement. C-900 PVC pipe as specified in Section 02500, CONVEYANCE

PROJECT 11880

PIPING – GENERAL, may be substituted for the PVC pipe specified in this Section.

- B. Damaged storm drain piping shall be replaced with the same size piping using materials as specified in this Section.

4.2 JOINTS

- A. As specified on the Data Sheets located at the end of this Section as a supplement.

4.3 SERVICE AND DRAIN CONNECTIONS

- A. Pipe and fittings for individual service connection shall be of one type of material throughout. No interchanging of pipe and fittings allowed. Long-radius bends shall be used for changes in directions, unless approved otherwise by ENGINEER.
- B. All sewer service connections shall be PVC.
- C. Residential Service: 6 inch.
- D. Commercial Service, Including Motel and Apartments: 6 inch, unless shown otherwise.
- E. Cleanouts and Covers:
 - 1. PVC for non-traffic areas as shown on the Drawings.
 - 2. No cleanouts are to be installed in the sidewalk, unless approved by the ENGINEER.
 - 3. Cast iron valve box and cover required for installation in driveways, sidewalks, swales or traffic areas, USF 7615 (FC); or equal.

4.4 CLOSED CIRCUIT TELEVISION (CCTV) EQUIPMENT

- A. The CCTV camera with rotating lens or pan and tilt shall be color and one specifically designed and constructed for such inspections. Lighting and camera quality shall be suitable to allow a clear, in-focus picture of a minimum of 6 inches to the entire inside periphery of the sewer pipe. The camera shall have a minimum resolution capability of 350 lines per inch. The camera shall record in VHS T 120 format. Do not use long play as quality is not acceptable.
- B. Color television monitors shall be provided. Monitors shall have a resolution capability of no less than 350 lines per inch. Continuously displayed on the monitors as part of the video presentation shall be the date of the survey, number designation of the manhole section being surveyed, and a continuous forward or reverse readout of the camera distance from the manhole of reference. Picture quality and definition shall be to the

PROJECT 11880

satisfaction of the OWNER's representative and if unsatisfactory, equipment shall be replaced at the CONTRACTOR's expense.

- C. A Polaroid type camera shall be available for making still photos for reproduction.
- D. CCTV inspection of sewers to be horizontally is required prior to excavation to verify lateral locations.

4.5 PIPE BEDDING AND PIPE ZONE MATERIAL

- A. Granular material as specified in Section 02320, TRENCH BACKFILL.

PART 3 EXECUTION

5.1 GENERAL

- A. Notify ENGINEER at least 2 weeks prior to field fabrication of pipe or fittings.
- B. Furnish feeler gauges of proper size, type, and shape for use during installation for each type of pipe furnished.
- C. Distributing Materials: Place materials along trench only as will be used each day, unless otherwise approved by ENGINEER. Placement of materials shall not be hazardous to traffic or to general public, obstruct access to adjacent property, or obstruct others working in area.

5.2 PREDIGGING AND RELOCATIONS OF WATER MAIN

- A. The CONTRACTOR is responsible to relocate and protect water mains that are within the construction limits of sewers, manholes, laterals, and appurtenances. Water mains shown on the drawings were located based on record drawings and general installation procedures. In certain instances it may be necessary to relocate the water main horizontally or vertically because the actual location is too close to a structure or conflicts with the new sewer main.
- B. At some locations the pre-digging of a water main is called out on the Drawings. However, some water mains may have to be relocated as a result of information gathered during the CONTRACTOR's excavation for the new sewers.
- C. In both instances, the CONTRACTOR is to expose the water main and provide the invert elevation and physical dimensions of the water main and adjacent structures to the ENGINEER. After review of the information, the ENGINEER will direct the CONTRACTOR how to proceed with the relocation.

PROJECT 11880

- D. When the CONTRACTOR is directed to relocate the water main it shall be accomplished by installing four 45-degree bends, two solid sleeves, and approximately 30 feet of PVC or DI pipe, depending on the existing material.
 - 1. The complete installation shall have all restrained joints including the connections to the existing pipe.
 - 2. The installation shall be cleaned and disinfected in accordance with the provisions of Section 02519, DISINFECTION OF WATER SYSTEMS.
- E. The CONTRACTOR may request a pre-dig and payment will be made only if the ENGINEER agrees that the situation justifies the need.
- F. In the instance where the CONTRACTOR does not pre-dig, but the ENGINEER decides that the water main should be relocated, payment will be made only for the relocation.
- G. In the instance where the CONTRACTOR does pre-dig, but the actual information reveals to the ENGINEER that the water main should not be relocated, payment will be made only for the pre-digging.
- H. Only water mains 2 inches and larger shall be considered for payment. Water mains and services smaller than 2 inches in diameter shall be considered incidental to the installation of the new sewers and be relocated at the sole cost of the CONTRACTOR.

5.3 EXAMINATION

- A. Verify size, material, joint types, elevation and horizontal location of existing pipeline to be connected to new pipeline or new equipment.
- B. Damaged Coatings and Linings: Repair using coating and lining materials in accordance with manufacturer's instructions.
- C. Repairs to Reinforced Concrete Pipe section will be allowed, only if approved in writing by ENGINEER. Damaged pipe which, in opinion of ENGINEER, cannot be repaired, will be rejected and removed from the Project site.

5.4 EXCAVATION

- A. Excavate pipe trenches as specified in Section 02316, EXCAVATION.
- B. The amount of trench length permitted to be open at one time shall not extend more than 400 feet of the pipe laying operations, unless approved by the ENGINEER.
- C. Place and compact bedding material as specified in Section 02320, TRENCH BACKFILL.

PROJECT 11880

5.5 PIPE PREPARATION AND HANDLING

- A. Pipe Distribution: Do not distribute more than 1 week's supply of materials in advance of laying, unless otherwise approved by ENGINEER.
- B. Inspect all pipe and fittings prior to lowering into trench to ensure no cracks, broken, or otherwise defective materials are being used.
- C. Clean ends of pipe thoroughly. Remove foreign material and dirt from inside of pipe and keep clean during and after laying.
- D. Use proper implements, tools, and facilities for the safe and proper protection of the work.
- E. Lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. Remove all damaged pipe from the jobsite. Do not drop or dump pipe into trenches under any circumstances.

5.6 INSTALLATION OF PIPE, FITTINGS, AND APPURTENANCES

- A. General:
 - 1. Keep trench dry until pipe laying and joining are completed. Take precautions to prevent "uplift" or floating of pipe prior to completion of backfill operation. If the excavation cannot be effectively dewatered the CONTRACTOR shall propose alternate pipe installation methodology for approval by the ENGINEER prior to proceeding. All requirements of Section 02320, TRENCH BACKFILL, will remain in effect.
 - 2. Pipe laying shall proceed upgrade with spigot ends pointing in direction of flow.
 - 3. When field cutting or machining pipe is necessary, use only tools and methods recommended by pipe manufacturer and approved by ENGINEER.
 - 4. Excavate bell holes at each joint to permit correct assembly and inspection of entire joint.
 - 5. Pipe shall be laid accurately to line and grade. Establish line and grade for pipe by use of lasers. Check for alignment and grade after joint has been made.
 - 6. Measure for grade at pipe invert, not at top of pipe.
 - 7. Pipe invert may deviate from line or grade up to 1/2 inch for line and 1/4 inch for grade, provided that finished pipe line will present a uniform bore, and such variation does not result in a level or reverse sloping invert, or less than minimum slope shown. As-built information will be collected on a daily basis as provided in Section 01040, COORDINATION. Pipe runs with less than the required slope will be required to be removed and replaced at the CONTRACTOR'S expense.

PROJECT 11880

8. Pipe bedding shall form a continuous and uniform bearing and support for the pipe barrel between joints. Pipe shall not rest directly on the bell or pipe joint.
 9. Prevent entry of foreign material into gasketed joints. The presence of debris in the main will require correction.
 10. Use gasket lubricant as recommended by gasket manufacturer. Assemble joint in accordance with recommendations of manufacturer.
 11. No pipe shall be laid until the two preceding lengths have been thoroughly embedded in-place, so as to prevent moment or disturbance of the pipe.
 12. Apply sufficient pressure in making joint to assure that joint is "home" as defined in standard installation instructions provided by pipe manufacturer. Inside joint space shall not exceed 50 percent of pipe manufacturer's recommended maximum allowance.
 13. Whenever the pipe laying is discontinued, as at night, the unfinished end is to be securely protected from displacement by laying of the banks or from other injury, and a suitable stopper is to be inserted into the pipe end to prevent clogging of the pipe.
 14. Plug or close off pipes which are stubbed off for manhole, concrete structure, or for connection by others, with temporary watertight plugs.
 15. Connections between one pipe material and another shall be by means of flexible compression collar, installed in accordance with the manufacture's recommendations, or concrete closure collar.
- B. Connection to Structure or Manhole:
1. Locate standard pipe joint within 1.5 feet outside face of structure for pipe 18 inches and smaller and within one pipe diameter for pipe 21 inches and larger.
 2. Connect PVC pipe to manhole or structure with pipe to manhole connector in accordance with manufacturer's recommendations.
- C. Crossing Waterlines: Where sanitary sewer crosses less than 18 inches below waterline, use ductile iron or PVC pressure pipe for crossing or encase in concrete envelope for a minimum distance of 9 feet on each side of waterline.
- D. Concrete Closure Collars: Only use concrete closure collars where shown or authorized by ENGINEER.
- E. Service Connections:
1. Minimum Slope: 1/8-inch per foot.
 2. Minimum Trench Depth: 3 feet at property line or on property within permanent sewer easement. ENGINEER will determine required depth at end of line in each case.
 3. Progress of Construction: Unless otherwise approved by ENGINEER, install service connections not more than 5 days after backfilling of sewer trench in block or equivalent 400-foot section of sewer.

PROJECT 11880

4. Service Connection Tees or Wyes: Furnish tee or wye outlets with gasketed type joint or approved adapter to join service connection pipe. Concrete encase tees or wyes deeper than 12 feet. Do not encase joints at ends of tee or wye fittings.
5. Disconnecting and Reconnecting Existing Service Connections:
 - a. Locate the existing service connections prior to constructing the tee in the new sewer line.
 - b. First length of pipe out from tee on lateral or main shall not be greater than 3 feet in length.
 - c. Maximum deflection permissible with any one fitting shall not exceed 45 degrees and shall be accomplished with long-radius curves or bends. Short-radius elbows or curves will not be permitted, except by permission of ENGINEER.
 - d. Disconnect existing service connections from existing sewers to be abandoned and reconnect them to the new sewers.
 - e. Make service connection to sewer system at manhole when directed by ENGINEER. Where service connection pipe is connected to manhole or concrete structure, make connection so standard pipe joint is located not more than 1.5 feet from structure.

5.7 BACKFILLING AND COMPACTION

- A. Backfill and compact all pipe trenches as specified in Section 02320, TRENCH BACKFILL.
- B. Repair excavations in roadways as specified in Section 02772, ASPHALT CONCRETE PAVEMENT, or Section 02575, SURFACE RESTORATION.

5.8 WORK STOPPAGE

- A. If the Work is stopped on the whole or any part of the trench, and the same is left open for an unreasonable length of time in advance of the construction for any reason except delay in removing obstructions over which the CONTRACTOR has no control, the CONTRACTOR shall, when directed, refill such trench or part thereof and temporarily repave over the same with 8-inch rock base and asphalt cold patch at his own cost and expense, and he shall not again open such trench or part thereof until he is ready to proceed with construction.

5.9 SEWER CLEANING AND CCTV INSPECTION

- A. Prior to final acceptance and final manhole-to-manhole inspection of the sewer system by ENGINEER, flush and clean all parts of the system. Remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, use mechanical rodding or bucketing equipment.

PROJECT 11880

- B. The following general procedure shall be followed to pressure clean and televise the sewer pipes. The work shall be accomplished completely in one manhole section at a time. A manhole section is defined as the length of pipe connecting two manholes. Internally inspect pipelines by CCTV after the completion of pipeline cleaning and testing. Conduct inspection in presence of ENGINEER.
1. High-pressure clean a manhole section.
 2. Inspect the manhole section internally with TV within 3 days of cleaning, and make a log of conditions encountered.
 3. Simultaneous with TV inspection make a video tape recording of each manhole section.
 4. Take Polaroid or digital photos of the monitor image as required by the ENGINEER.
 5. Plug off manhole at ends of line so no flow enters new sewer pipe except that from service connections.
 6. Pull camera at uniform rate, stopping to properly document defects. Maximum pull of camera shall not exceed 30 feet per minute.
- C. Provide detailed information on the videotape at each starting manhole and similar information on the sewer logs. At a minimum, provide company name, project name, date of video, street name, manhole number, manhole-to-manhole run, manhole diameter, direction of flow, size of pipe, type of pipe, crew leader name, OWNERS's inspector's name, lateral location (footage from manhole), and direction (north, south, east, or west).
- D. Show sufficient detail to determine cracks in pipe, offset joints, leaking joints, sags and other flaws in pipeline installation. Record location of deficiencies by distance from center of reference manhole.
- E. Upon completion, playback tape in presence of ENGINEER. Any tape not meeting quality standard will be rejected and taping process repeated.
- F. Correct deficiencies in pipe found as a result of video replay. Replace any sewer pipe which has any deficiencies specified. Grouting of leaky joints or damaged pipe on new sewer pipe will not be accepted. Re-inspect the replaced pipe for deficiencies and replace pipe until no deficiencies exist.
- G. Dispose of cleaning water in a manner that will not damage or interfere with adjacent property and in a manner acceptable with ENGINEER and regulatory agencies.

5.10 HYDROSTATIC TEST

- A. General:
1. Notify ENGINEER in writing 5 days in advance of testing. Perform testing in presence of ENGINEER.

PROJECT 11880

2. Test sections of constructed sewer between stations only after service connections, manholes, and backfilling have been completed. Testing may be done prior to placement of asphaltic concrete or roadway structural section.
 3. Isolate new pipelines that are connected to existing pipelines. Install pipe plugs as required to allow section of new pipe to be pressure tested.
 4. Plug wyes, tees, stubs, and service connections with gasketed caps or plugs securely fastened or blocked to withstand internal test pressure. Such plugs or caps shall be removable, and their removal shall provide socket suitable for making flexible jointed lateral connection or extension.
 5. Furnish testing equipment and perform tests as approved by ENGINEER. Testing equipment shall provide observable and accurate measurement of leakage under specified conditions.
 6. Provide and bear costs of necessary water required for testing project piping.
- B. Testing Equipment Accuracy: Plus or minus 1/2-gallon of water leakage under specified conditions.
- C. Maximum Allowable Leakage: 0.16 gallons per hour per inch diameter per 100 feet. Include service connection footage in test section, subjected to minimum head specified.
- D. Exfiltration Test:
1. Hydrostatic Head:
 - a. At least 6 feet above maximum estimated groundwater level in section being tested.
 - b. No less than 6 feet above inside top of highest section of pipe in test section, including service connections.
 2. Length of Pipe Tested: Limit length such that pressure on invert of lower end of section does not exceed 30 feet of water column.
- E. Infiltration Test:
1. Groundwater Level: At least 5 feet above inside top of highest section of pipe in test section, including service connections.
 2. Visible infiltration will require correction.
- F. Piping with groundwater infiltration rate greater than allowable leakage rate for exfiltration will be considered *defective* even if pipe previously passed a pressure test.
- G. Defective Piping Sections: Replace, and retest as specified.

PROJECT 11880

5.11 LOW PRESSURE AIR TESTING

- A. In accordance with ASTM F-1417.
- B. General:
 - 1. Notify ENGINEER in writing 5 days in advance of testing. Perform testing in presence of ENGINEER.
 - 2. Test sections of constructed sewer between stations only after service connections, manholes, and backfilling have been completed. Testing may be done prior to placement of asphaltic concrete or roadway structural section.
 - 3. Isolate new pipelines that are connected to existing pipelines. Install pipe plugs as required to allow section of new pipe to be pressure tested.
 - 4. Plug wyes, tees, stubs, and service connections with pneumatic plugs. The plug design shall be such that they will hold against the test pressure without external blocking or bracing. Such plugs shall be removable, and their removal shall provide socket suitable for making flexible jointed lateral connection or extension. One of the plugs shall have 3 air hose connections; one for inflating the plug, one for reading the air pressure and one for introducing air into the sealed line.
 - 5. Furnish testing equipment and perform tests as approved by ENGINEER. Testing equipment shall provide observable and accurate measurement of leakage under specified conditions. Calibrate gauges with standardized test gauge at start of each testing day. Install compressor, air piping manifolds, gauges, and valves at ground surface.
 - 6. Provide pressure release device, such as rupture disc or pressure relief valve, to relieve pressure at 8 psig or less.
 - 7. If the groundwater is higher than the top of the pipe, the test pressure shall be increased by 0.43 psi/foot up to five (5) feet above the top of the pipe. For groundwater in excess of 5 feet above the top of the pipe, infiltration testing shall be conducted.
- C. No person shall enter manhole or structure, or occupy area above opening of manhole or structure where pipe is under pressure.
- D. Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure resulting from any groundwater above the pipe. At least two minutes shall elapse to allow the pressure to stabilize.

PROJECT 11880

- E. The time required for the internal pressure to decrease from 3.5 to 2.5 psig greater than the average back pressure shall not be less than the time shown for a given pipe diameter:

<u>Pipe Diameter (in.)</u>	<u>Minimum Elapsed Time (min.)</u>
8	7.5
10	9.25
12	11.25
15	14
18	17

- F. Defective Piping Sections: Replace, and retest as specified.

5.12 PVC PIPE DEFLECTION TESTING

A. General:

1. Test installed gravity PVC pipeline by pulling a mandrel through the main without the use of a mechanical pulling device.
2. Perform the test at least 10 days after trench backfill and compaction have been completed.

B. Mandrel:

1. Full circle, solid or rigid legged (9 min) steel cylinder with pulling rings at each end.
2. Sized to allow an ultimate deflection of less than 5 percent minimum size, 96.67 percent if inside pipe diameter.

C. Correcting Deficiencies:

1. Excavate to spring line and replace and re-compact pipe zone material.
2. Internal pipe re-rounding or vibration will not be permitted.
3. If pipe does not past mandrel test following (1), replace pipe section.

5.13 INTERNAL INSPECTION (LAMPING)

A. Notifications:

1. Notify ENGINEER:
 - a. If depth of flow in pipeline exceeds 50 percent of pipe diameter.
 - b. If conditions for lamping activities are found to be unsafe or impractical.

B. Inspection Equipment:

1. Allows inspection from surface.
2. Equip with:
 - a. Belt-mounted, rechargeable battery and control.

PROJECT 11880

- b. Telescoping Pole: 18 feet long, maximum.
 - c. Flood lamps.
- C. ENGINEER will be present during initial inspections to establish quality guidelines. All lamping shall be conducted in the presence of an OWNER's Representative.
- D. Prevent unnecessary disruption of traffic and access to residences or businesses.
- E. Provide one person, in addition to physical inspection crew, to work from surface only.
- F. Record defects that are visible from manhole.

5.14 SUPPLEMENTS

- A. The supplements listed below, following "END OF SECTION," are part of this Specification.
 - 1. Data Sheets.

Number	Title
-03	Polyvinyl Chloride (PVC)
-05	Reinforced Concrete

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 02632-03 POLYVINYL CHLORIDE (PVC)	
Item	Description
Pipe: 15-inch diameter and under	ASTM D3034: Standard dimension ratio less than 26, except that the cell classification shall be 12454-B or 12454-C as defined in ASTM D1784.
Pipe: 18 through 24-inch diameter	ASTM F679: Standard dimension ratio less than 18, except that the cell classification shall be 12454-C as defined in ASTM D1784.
Ribbed Profile Pipe: 18- through 36-inch diameter	ASTM F794: Minimum stiffness of 46 psi when tested in accordance with ASTM D2412, except that the cell classification shall be 12454-C as defined in ASTM D1784.
Joints	ASTM D3212 rubber gasketed.
Gaskets	ASTM F477. Lubricants: As approved by manufacturer.
Fittings	PVC, gasketed. Provide plug when service piping is not required.
Plugs	Removable. Removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
Source Quality Control Testing	In accordance with specified ASTM.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 02632-05 REINFORCED CONCRETE	
Item	Description
Pipe	ASTM C76, Wall B, class as shown. Mark each joint with pipe class. Rotating packer or platform not allowed.
Cement	ASTM C150, Type II. ASTM C150, Type I, with fly ash; maximum 12 percent Tricalcium Aluminate. ASTM C595 Rev A, Type IP, with fly ash; Cement: ASTM C150. Minimum 564 pounds per cubic yard without fly ash. Minimum 479 pounds per cubic yard with fly ash.
Ratio: Water to Cementitious Materials	Not over 0.49.
Fly Ash	ASTM C618, Class C or Class F, Tables 1 and 2 modified as follows: Loss on Ignition: Maximum 3 percent Water Requirement: Maximum 100 percent of control Ratio Percent CaO/Fe ₂ O ₃ : Maximum 1.5 or test cement fly ash mix in accordance with ASTM C1012. Mix: Equal to or better than ASTM C150, Type II cement. 85 pounds per cubic yard minimum, 160 pounds per cubic yard maximum. Test: ASTM C311 and ASTM C618.
Joints	ASTM C443 Rev A. Captive gasket in groove.
Rubber Gaskets	ASTM C443.
Tee Fittings	Reinforced concrete, rubber gasketed. Provide plug when service piping is not required.
Plugs	Removable. Removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
Circumferential Reinforcement	Not closer than 1-inch to inside surface of pipe. Area of outer circular reinforcing cage not less than 75 percent of inner cage.
Elliptical Reinforcement	Not allowed.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 02632-05 REINFORCED CONCRETE	
Item	Description
Source Quality Control Testing	<p>Load Bearing 0.01-inch Crack, Compressive Strength and Absorption: ASTM C76.</p> <p>Load Bearing Ultimate: ASTM C76.</p> <p>Permeability: ASTM C497.</p> <p>Voids: Longitudinally sawcut one pipe from each 100 lengths of pipe manufactured in half with saw that will not damage the concrete or reinforcing steel. Inspect for voids adjacent to circumferential bars. Voids will be considered continuous if a 1/16-inch diameter pin can be inserted 1/4-inch deep. If voids exist adjacent to more than 10 percent of the circumferential bars, two additional pipe shall be tested. If either of the two pipe fail, the entire 100 lengths will be rejected.</p>

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 02655

NON-STRUCTURAL MANHOLE LINING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: Work required for the various types of manhole coatings/linings identified in the repair schedule contained in the plans. The materials and methods included in this section are designed to eliminate infiltration through manhole walls and prevent further deterioration/corrosion of the interior of manholes. Materials of linings include spray applied elastomeric resins and concrete embedment polyvinyl chloride and high density polyethylene liners.
- B. Related Work Specified Elsewhere includes:
 - 1. Section 01026 – Measurement and Payment
 - 2. Section 01300 – Submittals
 - 3. Section 02676 – Leakage Tests
 - 4. Section 02999 – Miscellaneous Work and Cleanup

1.2 SUBMITTALS

- A. CONTRACTOR shall submit manufacturer's technical literature on material and description of installation method including, but not limited to:
 - 1. Requirements for application, such as temperature and humidity
 - 2. Requirements for worker safety, such as ventilation and safe handling procedures
 - 3. Maximum storage life
 - 4. Mixing and proportioning requirements for specific application
 - 5. Pot life
 - 6. Curing time
 - 7. Physical properties
 - 8. Test results on resistance to abrasive chemicals

NON-STRUCTURAL MANHOLE LINING

1.3 QUALITY ASSURANCE

1. Product application shall be performed only by workmen trained and experienced with specified material and trained in confined space entry.
2. Certification: Applicators for spray-applied coating installation shall be certified by the manufacturer.
3. Spray equipment shall be specifically designed to accurately ratio and apply the coating products and shall be in good working order.
4. Contractor Experience: Minimum of five (5) years of experience with similar applications of the materials specified.

PART 2 PRODUCTS

2.1 SPRAY APPLIED RESINS

- A. The spray-applied coating shall be resistant to hydrogen sulfide gas, sulfuric acid, and other chemicals typically found in sanitary sewers.
- B. The spray-applied coating shall also be resistant to damage due to impact and abrasion.
- C. The spray-applied coating shall be an elastomeric polymer compound; e.g., Integrated Environmental Technologies (IET), Raven or pre-approved equal. The liner shall conform to the minimum physical requirements listed below.

Hardness (Shore D), ASTM D2240	65 +/- 5
Tear Strength (Die C), ASTM D624	190 psi
Tensile Strength (ASTM D412)	2000 psi
Chemical Resistance (ASTM D543) – Exposure to sodium hypochlorite (10 percent) and sulfuric acid (15 percent) for 168 hours	No degradation in physical or mechanical properties

NON-STRUCTURAL MANHOLE LINING

02655-2

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 3 EXECUTION

3.1 GENERAL

- A. All pipes in service shall be plugged or bypassed in accordance with Section 02750 before any work is started on the structure. No debris shall be flushed down the line.
- B. Only personnel who are aptly trained in confined space entry shall be permitted to enter the structure. All OSHA requirements for confined space entry equipment and permitting shall be complied with. The Contractor shall obtain a confined space entry permit from Lee County Utilities prior to beginning any work.

3.2 SPRAY APPLIED RESINS

A. PREINSTALLATION/SURFACE PREPARATION

- 1. High pressure grout: High pressure grout shall be injected from the interior of the manhole surfaces into cracks and voids in order to stop leaks. The use of hydraulic cement will not be allowed.
 - a. Suitable equipment shall be utilized for pumping the grout from above ground through a hose and injecting the grout under pressure to fill voids beyond the manhole structure. The equipment shall have a means of measuring the amount of grout used in gallons.
 - b. Grout shall be used in accordance with the manufacturer's recommendations for the specific application.
 - c. The following are acceptable grout products: Avanti AV-202 Multigrout or pre-approved equal
- 2. Patching cement: After all loose and deteriorated material has been removed from the interior surfaces of the manhole and after all leaks have been grouted, patching cement shall be applied to fill in any irregularities to achieve an acceptable smooth surface.
 - a. Patching Cement shall be compatible with the liner material as specified in 2.2 herein.
- 3. Evaluation of Atmosphere: Prior to entering structures, an evaluation of the atmosphere shall be conducted to determine the presence of toxic, flammable vapors or possible lack of oxygen. The evaluation

NON-STRUCTURAL MANHOLE LINING

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

shall be in accordance with local, state or federal safety regulations.

4. Clean manhole ring and cover free of rust and debris so the lid will properly seat when reinstalling the lid. Use power brushing such as wire wheel on a grinder/needle gun as most types of debris cannot be removed by hand wire brushing.
 5. Surfaces to be lined shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide strong bond between the lining and substrate.
 6. High pressure water jetting (NACE Standard No. 5/SSPC-SP12) abrasive (sand) blasting, and mechanical wire-brushing shall be the methods to remove previous coatings, laitance, contaminated, disintegrated or chalky material. Detergent water cleaning and hot water blasting may be necessary to remove oil and grease.
 7. Use of acid for cleaning purposes, no matter how dilute, will not be allowed. Loose or protruding brick, mortar and concrete shall be removed by using a mason's hammer and chisel. Fill any large voids with quick setting cement patch mix recommended by the manufacturer of liner product. The surface to be repaired must be clean and free of any loose materials.
 8. Application of liner shall not be made unless the ambient temperature inside the structure is 50 degrees °F or higher.
 9. After the patched areas have cured sufficiently, prepare manhole wall surfaces in accordance with the manhole liner manufacturer's recommendations.
 10. All resurfaced or repaired surfaces shall be inspected for cleanliness and suitability to receive spray-applied liner. Additional surface preparation may be necessary prior to application.
- B. Apply manhole liner in accordance with manufacturer's recommendations regarding temperature and installation procedures and in accordance with City of Fort Lauderdale Utilities specifications. The liner shall be applied to the invert and walls of the manhole from the bench up to the bottom of the casting.
- C. Prepared surfaces shall be lined by spray application to a minimum wet film thickness of 125 mils.
- D. During application, a wet film thickness gauge meeting ASTM D4414 shall be used. All necessary measurements shall be taken and attested

NON-STRUCTURAL MANHOLE LINING

02655-4
CAM 16-1224
EXHIBIT 4
Page 299 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

to by the Contractor. Written reports signed by the Contractor shall be given to the COUNTY and Engineer.

- E. Allow the final application to cure for the amount of time recommended by the manufacturer before being subjected to sewage flow, or installation of spray-applied liner (where indicated).

3.4 QUALITY CONTROL

A. SPRAY APPLIED RESINS

1. Inspect lining system for holidays, cracks, and pinholes using the spark-test method and equipment in accordance with NACE RPO 188. Especially check the lining over brick, block, and very rough surfaces.
2. Repair voids and holidays per the manufacturer's instructions. All welds shall be physically tested by a nondestructive probing method. All patches over holes, or repairs to the liner wherever damage has occurred, shall be accomplished in accordance with Item 3.3 (F).

3.5 SAFETY

CONTRACTOR shall carry out operations under this section in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving entry into a confined space. It shall be CONTRACTOR's responsibility to comply with OSHA Standard and Regulations pertaining to all aspects of the work.

PART 4 WARRANTY

Provide a ten (10) year unlimited warranty on all workmanship and products. The work covered by the warranty shall include surface preparation, grouting, liner application, as well as other work performed under this section. The warranty shall be effective beginning on the date of final acceptance by City of Fort Lauderdale Utilities, and shall guarantee that the manhole will be protected from leaks and from failure due to corrosion from exposure to hydrogen sulfide and other corrosive chemicals normally encountered in raw sewage.

END OF
SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 02656
MANHOLE REPAIRS

PART 1 GENERAL

1.1 SUMMARY

Section includes: Work required for the various types of manhole repairs to prevent inflow (rainwater entering into manholes through frame/lid and chimney). Materials and methods include sealing manhole chimneys with cured-in-place or prefabricated products and manhole frame/cover sealing/replacement. Chimney seals shall be provided for (i) All manholes where the existing frame is to be removed and either reset or replaced with a new frame (ii) Manhole chimneys where inflow is detected.

A. Related Work Specified Elsewhere includes:

1. Section 01026 – Measurement and Payment
2. Section 01300 – Submittals
3. Section 02999 – Miscellaneous Work and Cleanup
4. Section 02222 – Excavation - Earth and Rock
5. Section 02223 – Backfilling
6. Section 02400 – Lawn Restoration
7. Section 02575 – Pavement Repair and Restoration
8. Section 02654 – Structural Manhole Lining
9. Section 02655 – Non-Structural Manhole Lining

1.2 SUBMITTALS

A. Contractor shall submit manufacturer's technical literature on material and description of installation method including, but not limited to:

1. Requirements for application, such as temperature and humidity
2. Requirements for worker safety, such as ventilation and safe handling procedures
3. Maximum storage life
4. Mixing and proportioning requirements for specific application (cured-in-place products)
5. Pot life (cured-in-place products)
6. Application thickness per coat (cured-in-place products)

MANHOLE REPAIRS

02656-1

7. Curing time (cured-in-place products)

1.3 QUALITY ASSURANCE

- A. Product application shall be performed only by workmen trained and experienced with specified material and trained in confined space entry.
- B. Certification: Applicators for spray-applied coating installation shall be certified by the manufacturer.
- C. Contractor Experience: Minimum of five (5) years of experience with similar applications of the materials specified.

PART 2 PRODUCTS

2.1 FRAME & COVER

- A. Castings for manhole frames and covers shall conform to ASTM A48 Class 30 and shall be traffic bearing.
- B. The seating surfaces between frames and covers shall be machined to fit true so the frames and covers do not shift under traffic conditions or permit entry of stormwater from flooding.
- C. Lifting or pick holes shall be provided, but shall not penetrate the cover.
- D. The words "SANITARY SEWER" and "CITY OF FORT LAUDERDALE" shall be cast in all manhole covers.
- E. Manhole frames and covers shall be EJ USA Inc. Product number NPR13-2378B or pre-approved Equal.
- F. Two rows of butyl rubber rope mastic shall be applied to the top surface of the manhole chimney or cone (whichever the frame will attach to). The frame shall be carefully set onto the rope mastic so that the frame opening is concentric to the manhole opening.
- G. Inflow protectors shall be provided for all manholes. ABS or 304 stainless steel inflow protectors shall be provided for manholes in non-traffic bearing locations. High-quality 304 stainless steel inflow protectors with a consistent thickness of not less than 18 gauge shall be provided for manholes in traffic bearing locations.

MANHOLE REPAIRS

02656-2

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- H. Inflow protectors shall have a deep dish bowl design with no less than 8 inches in depth to allow easy and unobstructed removal of the manhole cover.
- I. Manhole inflow protectors are to be manufactured with a one-piece gasket installed at the factory for a tight, consistent fit. The rubber gasket is to be designed to securely wrap around the entire leading edge of the inflow protector at the point where it comes in contact with the manhole frame and cover.
- J. The wrap-around rubber gasket is to be manufactured to a width of no less than 3/8 inches, consistent on top and bottom of the leading edge of the inflow protector. The gasket shall be no more than 3/32 inches thick.
- K. The insert removal handle shall be manufactured of high-quality stainless steel for strength and durability. The handle shall be installed in such a way that it does not interfere with the installation or removal of the manhole cover. The handle shall be designed and manufactured to withstand a minimum pull force of 500 pounds before it fails or separates from the insert.
- L. The inscription "PROPERTY OF FORT LAUDERDALE UTILITIES" shall be etched at the base of the handle frame to provide a long-lasting identification marker for the OWNER.
- M. Inflow protectors shall be as manufactured by Sewer Shield, Inc., Maitland, FL or pre-approved Equal.

2.4 BENCH AND INVERT

Repair of bench and invert shall be accomplished utilizing either the Raven or IET product in accordance with sections 02656-01 or 02656-02 or cementitious lining material as follows:

- A. Specially formulated prepackaged mixes shall be used. The material shall be fiber reinforced and contain special additives which produce a minimum 24- hour compressive strength of 3,000 psi, and a minimum 28-day compressive strength of 8,000 psi. The material shall form a mechanical and chemical bond to the manhole surface and have zero shrinkage.
- B. The mortar shall include calcium aluminate or other Engineer-approved substance to be suited for resistance against corrosion.
- C. Bench Application:

MANHOLE REPAIRS

02656-3

CAM 16-1224
EXHIBIT 4
Page 303 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. The bench shall be sprayed such that a gradual slope is produced from the walls to the invert with the thickness at the edge of the invert being no less than ½ inch. The materials shall be applied to the bench area in such a manner as to provide for proper drainage without ponding. The material shall be smooth steel trowel finish sloping from wall to invert. The bench intersection shall be rounded to a uniform radius the full circumference of the intersection.

D. Invert Repair:

- a. Invert repair shall be performed on all inverts with visible damage or infiltration as identified by the OWNER. After blocking the flow through the manhole and thoroughly cleaning the invert, a quick-setting patch mix shall be applied to the invert in an expeditious manner. The mix shall be troweled uniformly onto the invert, extending out onto the bench sufficiently to tie into the liner spay applied to the bench or to the existing manhole bench. The finished invert shall be U-shaped uniform with pipe diameter with a minimum depth of 6" for 8" pipe and full depth for greater sized mains. Finish is to be that accomplished by steel trowel. Pipe crowns are to be built on all pipes. Invert shall be at least 2" thick, and be smooth and free of ridges.

E. Curing:

- a. Material shall be cured according to the manufacturer's instructions and recommendations
- b. Caution should be taken to minimize exposure of applied product to sunlight and air movement. At no time should the finished product be exposed to sunlight or air movement for longer than 15 minutes curing the curing process before replacing the manhole cover.

3.0 WARRANTY

- A. Provide a ten (10) year unlimited warranty on all workmanship and products. The work covered by the warranty shall include surface preparation, grouting, liner application, as well as other work performed under this section. The warranty shall be effective beginning on the date of final acceptance by Lee County Utilities, and shall guarantee that the manhole will be protected from leaks and from failure due to corrosion from exposure to hydrogen sulfide and other corrosive chemicals normally encountered in raw sewage.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

END OF
SECTION

MANHOLE REPAIRS

02656-5

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02710
LIMEROCK BASE****PART 1 GENERAL****1.01 DEFINITIONS**

- A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross section.
- B. Completed Lift: Compacted with uniform surface reasonably true to cross-section.

PART 2 PRODUCTS**2.01 LIMEROCK BASE ROCK**

- A. The material used in limerock base shall be material classified as Miami Oolite Formation.
- B. The minimum of carbonates of calcium and magnesium in the limerock shall be 70 percent. The maximum percentage of water-sensitive clay material shall be 3.
- C. Limerock material shall be uniform in color and not contain cherty or other extremely hard pieces, or lumps, balls, or pockets of sand or clay size material in sufficient quantities as to be detrimental to the proper bonding, finishing, or strength of the limerock base.
- D. The limerock base shall be uniformly graded from coarse to fine with 97 percent passing a 3-1/2-inch sieve, 80 percent passing a 2-inch sieve. The fine material shall consist entirely of dust of fracture. All crushing or breaking up, which might be necessary in order to meet such size requirements, shall be done before the material is placed on the road.
- E. Physical Qualities:
 - 1. Liquid Limit, AASHTO T89: Maximum 35 percent.
 - 2. Nonplastic.
 - 3. Limerock material shall have an average limerock bearing ratio (LBR) value of not less than 100.

2.02 SOURCE QUALITY CONTROL

- A. Contractor: Perform tests necessary to locate acceptable source of materials meeting specified requirements.
- B. Final approval of aggregate material will be based on materials' test results on installed materials.

LIMEROCK BASE

CA 0271024
EXHIBIT 4
Page 306 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

PART 3 EXECUTION**3.01 SUBGRADE PREPARATION**

- A. As specified in Section 02319, Subgrade Preparation.
- B. Obtain Engineer's acceptance of subgrade before placement of limerock base rock.
- C. Do not place base materials on soft, muddy subgrade.

3.02 EQUIPMENT

- A. Use mechanical rock spreaders, equipped with a device that strikes off the rock uniformly to laying thickness, capable of producing even distribution. For areas where the use of a mechanical spreader is not practicable, the Contractor may spread the rock using bulldozers or blade graders.

3.03 HAULING AND SPREADING

- A. Hauling Materials:
 - 1. The limerock shall be transported to the point where it is to be used and dumped on the end of the preceding spread.
 - 2. Do not haul over surfacing in process of construction.
 - 3. Loads: Of uniform capacity.
 - 4. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.
- B. Spreading Materials:
 - 1. Distribute material to provide required density, depth, grade and dimensions with allowance for subsequent lifts.
 - 2. Produce even distribution of material upon roadway without segregation.
 - 3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.

3.04 CONSTRUCTION OF COURSES

- A. General: Complete each lift in advance of laying succeeding lift to provide required results and adequate inspection.
- B. Limerock Base:
 - 1. Maximum Completed Lift Thickness: 6 inches or equal thickness.
 - 2. Completed Course Total Thickness: As shown.
 - 3. Spread lift on preceding course to required cross-section.

LIMEROCK BASECA 0271022
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Lightly blade and roll surface until thoroughly compacted.
5. Blade or broom surface to maintain true line, grade, and cross-section.

C. Gravel Surfacing:

1. Maximum Completed Lift Thickness: 6 inches or equal thickness.
2. Completed Course Total Thickness: As shown.
3. Spread on preceding course in accordance with cross-section shown.
4. Blade lightly and roll surface until material is thoroughly compacted.

3.05 ROLLING AND COMPACTION

- A. Commence compaction of each layer of base after spreading operations and continue until density of 98 percent of maximum density has been achieved as determined by AASHTO T 180.
- B. Roll each course of surfacing until material shall not creep under roller before succeeding course of surfacing material is applied.
- C. Commence rolling at outer edges of surfacing and continue toward center; do not roll center of road first.
- D. When the material does not have the proper moisture content to ensure the required density, wet or dry, as required. When adding water, uniformly mix it in by disking to the full depth of the course that is being compacted. During wetting or drying operations, manipulate as a unit, the entire width and depth of the course that is being compacted.
- E. Place and compact each lift to required density before succeeding lift is placed.
- F. Bind up preceding course before placing leveling course. Remove floating or loose stone from surface.
- G. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.
- H. Surface Defects: Remedy surface defects by loosening and rerolling. Reroll entire area, including surrounding surface, until thoroughly compacted.
 1. Finished Surface: True to grade and crown before proceeding with surfacing.

3.06 SURFACE TOLERANCES

- A. Finished Surface of Base Course and Leveling Course: Within plus or minus 0.10-foot of grade shown at any individual point.
- B. Compacted Surface of Leveling Course: Within 0.04-foot from lower edge of 10-foot straightedge placed on finished surface, parallel to centerline.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.07 DRIVEWAY RESURFACING

- A. Replace gravel surfacing on driveways which were gravel surfaced prior to construction.
- B. Provide compacted gravel surfacing to depth equal to original, but not less than 4 inches.
- C. Leave each driveway in as good or better condition as it was before start of construction.

3.08 FIELD QUALITY CONTROL

- A. In-Place Density Tests:
 - 1. Construct base course so areas shall be ready for testing.
 - 2. Allow reasonable length of time for Engineer to perform tests and obtain results during normal working hours.

3.09 CLEANING

- A. Remove excess material; clean stockpile areas of aggregate.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02726
WET WELL AND VAULT CONSTRUCTION****PART 1 GENERAL****1.1 SUBMITTALS****A. Shop Drawings:**

1. Precast Wet Wells and Vaults: Details of construction.
2. Precast Base Sections: Details of construction.

B. Quality Control Submittals:

1. Concrete: Proposed curing method for cast-in-place concrete structures.
2. Precast Sections: Manufacturer's results of tests performed on representative sections to be furnished.
3. Manufacturer's Certification for Liner System.

PART 2 PRODUCTS**2.1 BASE ROCK****A. FDOT No. 57 stone.****2.2 CONCRETE****A. Ready-mixed, meeting ASTM C94, Alternate 2, and the following:**

1. Minimum Compressive Strength: 4,000 psi at 28 days.
2. Maximum Aggregate Size: 1-1/2 inches.
3. Slump: 2 to 4 inches.
4. Cement: ASTM C150, Type II.
5. Minimum Cement Content: 564 pounds per cubic yard.
6. Water Cement Ratio: Maximum of 0.49.

2.3 MORTAR**A. Standard premixed meeting ASTM C387, or proportion 1 part Portland cement to 2 parts clean, well-graded sand which will pass a 1/8-inch screen.****B. Admixtures: May be included but do not exceed the following percentages of weight of cement:**

1. Hydrated Lime: 10 percent.
2. Diatomaceous Earth or Other Inert Material: 5 percent.

C. Consistency:

WET WELL AND VAULT CONSTRUCTION

CA 02726-1
EXHIBIT 4
Page 310 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Tongue-and-Groove Type Joint: Such that mortar will readily adhere to pipe.
2. Confined Groove (Keylock) Joint: Such that excess mortar will be forced out of groove and support is not provided for section being placed.

2.4 BONDING AGENT

A. As manufactured by:

1. Sika Corp., Sikastix 370.
2. Sika Corp., Sikador Hi-Mod.
3. Horn Co., Epoxitite Binder 2385.

2.5 FORMS

- A. Exposed Surfaces: Plywood or steel panels.
- B. Other Surfaces: Matched boards, plywood, or other approved material.
- C. Trench walls, large rock, or earth are not acceptable form material.

2.6 REINFORCING STEEL

- A. Conform to ASTM A615, Grade 40, deformed bars.

2.7 CAST-IN-PLACE STRUCTURES

- A. Acceptable, subject to submittal and ENGINEER's approval.

2.8 PRECAST RISER SECTIONS

- A. Minimum 6 feet diameter for wet wells, or as shown on the Drawings. Valve vaults to be rectangular and dimensioned as shown on the Drawings. For other structures, conforming to ASTM C478 and the following:
 1. Minimum wall thickness as shown on Drawings.
 2. Top and bottom of sections shall be parallel.
 3. Confined O-ring with rubber gaskets meeting ASTM C443.
 4. External Coating: Koppers Bitumastic No. 300-M coal tar epoxy, or approved equal. Minimum 16 mils dry film thickness, first coat shall be red and second coat shall be black.
- B. Source Tests:
 1. Prior to delivery of any size precast manhole section to jobsite, conduct yard tests at point of manufacture.
 2. Precast sections to be tested will be selected at random from stockpiled material to be supplied for the job.
 3. All test specimens shall be mat tested and meet the permeability test requirements of ASTM C14.

2.9 PRECAST BASE SECTIONS AND BASES

WET WELL AND VAULT CONSTRUCTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. Preferred by ENGINEER, unless wet well is to be installed by tremie method. Separate slab and base sections with water proofing provision, only if approved.
- B. Valve Vault Base Sections: Base slab integral with sidewalls. Valve vaults shall be single section, unless approved by the ENGINEER. Valve vaults shall be less than 5 feet deep whenever possible to avoid classification as a confined space.
- C. Base Slab: Minimum 6 inches thick with No. 4 reinforcing bars, 8-inch centers, both directions in center of slab or as shown on the Drawings. Tie reinforcing steel to wall steel.
- D. Pipe penetrations for wet well section to be cored or cast in-place based on piping and pump layout. Penetrations for valve vault to be core-drilled based on final field adjustments of piping layout valve configuration.
- E. Provide cast in-place, Type 316 stainless steel anchored "J" bolts for pump bases as shown on the Drawings. Coordinate with pump supplier. Drilled anchors not permitted.

2.10 PREFORMED PLASTIC GASKETS

- A. Preferred in lieu of mortar type joints. Mortar joints to be used only in special circumstances and upon approval of the ENGINEER.
- B. Conform to requirements of Federal Specification SS-S-00210.
- C. Manufacturers:
 - 1. Hamilton Kent Manufacturing Co., Box 178, Kent, OH 44240, Kent-Seal No. 2.
 - 2. K. T. Snyder Co., Inc., Central National Bank Bldg., Houston, TX 77002, Ram-Nek.

2.11 CONCRETE PROTECTIVE LINER FOR NEW WET WELLS

- A. As manufactured by Sure-Grip polypropylene liner, as manufactured by U.S. Precast, Cape Coral, FL.

2.12 CONCRETE PROTECTIVE LINER FOR EXISTING WET WELLS

- A. Mainstay ML-72 Microsilica Cement Mortar with Mainstay DS-5 Epoxy Coating, as manufactured by Madewell Products Corp., Roswell, GA., or SewperCoat Calcium Aluminate Mortar as manufactured by LaFarge Aluminates, Chesapeake, VA,

2.13 REPAIR MATERIALS

- A. Nonshrink Grout: Grout shall be nonmetallic. The grout shall be nongas-liberating type, cement-base, premixed product requiring only the addition of water for the required consistency. All components shall be inorganic. The following listed grouts meet these requirements and are acceptable for use:

WET WELL AND VAULT CONSTRUCTION

CA 02726-3
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. HorngROUT, TAMMS Industries, Mentor, OH.
 2. UPCON Super Flow, The UPCO Company, Cleveland, OH.
 3. Set Grout, The Master Builders Co., Cleveland, OH.
 4. Crystex, L&M Construction Chemicals, Inc., Omaha, NE.
- B. Patching Mortar: Shall be as approved by waterproofing/structural repair materials manufacturer as listed in Paragraph Waterproofing/Structural Repair Material.
- C. Waterproofing/Structural Repair Material: The following listed waterproofing/structural repair materials are acceptable for use:
1. EMACO 588-CA, Master Builders, Inc., Cleveland, OH.
 2. QUADDEX QM-1s RESTORE, QUADDEX Sewer Rehabilitation Products of Maumelle, AR.
 3. Mainstay ML-72, Parson Environmental Products, Inc., Reading, PA.
- D. Concrete: Conform to the requirements of Section 03301, REINFORCED CONCRETE.
- E. Mortar: Mortar shall be sand/portland cement mix conforming to ASTM C270.
- F. Pipe Plugs: Pipe plugs shall be rubber gasketed test plugs, sized as necessary.
- G. Backfill: Conform to the requirements of Section 02320, TRENCH BACKFILL.

2.14 ACCESS COVERS AND FRAMES

- A. Access covers for the wet well shall allow for unrestricted vertical removal of the pumps in accordance with the pump manufacturers recommendations and requirements.
- B. Valve vault access covers shall allow for unrestricted vertical removal of valves and check valves.
- C. Access covers shall be as specified in Section 05500, METAL FABRICATIONS AND CASTINGS, and/or Section 11305, SUBMERSIBLE PUMPS.

PART 3 EXECUTION

3.1 EXCAVATION AND BACKFILL

- A. As specified in Section 02316, EXCAVATION.
- B. Backfill: Use highest class of trench backfill immediately adjacent, as shown.
- C. As specified in Section 02380, CAISSONS (WET WELLS). The wet wells are designed for installation as caissons. At the CONTRACTOR's option and at no additional cost, the wet wells may be installed using sheet piles and open excavation with dewatering as required. The CONTRACTOR shall submit an

WET WELL AND VAULT CONSTRUCTION

CA 02726-4
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

alternative design, including method and calculations for anti-flotation as a substitute for the tremie plug, prepared by a registered professional engineer.

3.2 BASE ROCK

- A. Remove water from the excavation.
- B. Place minimum of 6 inches of rock base (FDOT No. 57 stone) and thoroughly compact with a mechanical vibrating or power tamper.

3.3 CONCRETE BASE

- A. Construct concrete base and tremie plug as shown.
- B. Vibrate to densify concrete and screed so first precast section to be placed has a level, uniform bearing for full circumference.
- C. Deposit sufficient mortar on base to assure watertight seal between base and manhole wall, or place first precast section of manhole in concrete base before concrete has set. Properly locate and plumb first section.
- D. If material in bottom of trench is unsuitable for supporting manhole, excavate below the base as directed by ENGINEER, and backfill to required grade with rock, as specified in Section 02315, FILL AND BACKFILL, Article FOUNDATION STABILIZATION.

3.4 PLACING PRECAST SECTIONS

- A. Section Installation – Mortared Joints:
 - 1. Thoroughly clean ends of sections to be joined.
 - 2. Thoroughly wet joint with water prior to placing mortar.
 - 3. Place mortar on groove of lower section.
 - 4. Set next section in-place.
 - 5. Fill joint completely with mortar of proper consistency.
 - 6. Trowel interior and exterior surfaces smooth on standard tongue-and-groove joints.
 - 7. Prevent mortar from drying out and cure by applying an approved curing compound or comparable approved method.
 - 8. Do not use mortar mixed for longer than 30 minutes.
 - 9. Chip out and replace cracked or defective mortar.
 - 10. Completed Wet Wells and Vaults: Rigid and watertight.
- B. Section Installation - Preformed Plastic Gaskets: If used in lieu of mortar joints, install in accordance with manufacturer's instructions and the following:
 - 1. Carefully inspect precast sections to be joined.
 - 2. Do not use sections with chips or cracks in the tongue.
 - 3. Use only pipe primer furnished by gasket manufacturer.
 - 4. Install gasket material in accordance with manufacturer's instructions.
 - 5. Completed Wet Wells and Vaults: Rigid and watertight.

WET WELL AND VAULT CONSTRUCTION

CA 02726-3
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Rubber Gasketed Joints: Install in accordance with manufacturer's instructions.

3.5 PERMANENT PLUGS

- A. Clean interior contact surfaces of pipes to be cut off or abandoned as shown, and construct plug as follows:
 - 1. Pipe 18 Inches or Less in Diameter: Concrete plug in end, minimum 8 inches in length.
 - 2. Pipe 21 Inches and Larger:
 - a. Construct plugs of common brick, concrete block, or concrete.
 - b. Plaster exposed face of block or brick plugs with mortar.
 - 3. Plugs shall be watertight and capable of withstanding internal and external pressures without leakage.

3.6 CONCRETE STRUCTURES

- A. Excavation and Formwork:
 - 1. Remove and keep all water clear from the excavation.
 - 2. Place 6-inch minimum layer of base rock to undisturbed earth.
 - 3. Thoroughly compact base rock with a mechanical vibrating or power tamper.
 - 4. Form all vertical surfaces with materials as specified.
- B. Reinforcing Steel:
 - 1. Bar Splices: 24 diameters, but in no case less than 12 inches.
 - 2. Wire tie splices and intersections.
- C. Placing Concrete:
 - 1. Remove all water from forms prior to placing concrete.
 - 2. Place concrete so there is no segregation of aggregate and vibrate all concrete placed.
 - 3. Do not place concrete when ambient temperature is below 40 degrees F without special protection.
 - 4. Cure concrete for 7 days in an approved manner.
- D. Finish:
 - 1. After form removal, patch rock pockets, form tie holes, and irregularities with a stiff mixture of portland cement and sand mixed in same proportion as original mix.
 - 2. Steel trowel slabs and tops of walls.
 - 3. Finish exposed walls to produce a uniform, flat surface.
- E. Backfill:
 - 1. Remove all form materials and debris from excavations before placing any backfill.

WET WELL AND VAULT CONSTRUCTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Backfill around structures only after concrete has attained 2/3 of specified compressive strength.
3. Obtain ENGINEER's approval of concrete work prior to backfilling.

3.7 LINING SYSTEMS

- A. The installation of polypropylene concrete protective liner (CPL) into precast wet wells shall be accomplished only by a factory certified precast concrete manufacturer with a minimum of 5 years of precast manufacturing experience and a minimum of 5 years' experience in the installation of corrosion resistant liners in concrete structures. Upon request, the liner installer shall provide written certification that the installation is in accordance with the liner manufacturer's specifications.
- B. Placement of the liner on forms shall conform to the liner manufacturer's written instructions.
- C. Lining shall cover all vertical walls and bottom of top slab.
- D. If exposed concrete is visible at the section joints, an internal seal of liner material shall be welded over both sides of the joint in accordance with the manufacturer's recommendations. The preferred installation is liner returns over the joint edge and under the joint seal as shown on the Drawings.

3.8 WET WELL REHABILITATION

- A. Specific wet well repairs required are shown on the Drawings.
- B. Cleaning: All structures scheduled for rehabilitation shall be cleaned and scarified with a minimum 2,000 psi water jet at a minimum water temperature of 140 degrees F, or a 3,000 psi water jet at a minimum water temperature of 60 degrees F. The water jet shall hit the wall surface at as near a perpendicular angle as possible. Cleaning the walls from the surface without appropriate angled nozzles will not be accepted. All surface buildup and contamination and all loose mortar shall be removed during the cleaning process. If required, detergent and/or muriatic acid shall be used to remove grease, oil, and other matter that would prevent a good adhesive. Specific manufacturer's recommendations may require additional cleaning measures. Before cleaning, the CONTRACTOR shall install wire mesh screening over the inlet and outlet pipes to prevent materials from entering the sewer system. Remove all debris from the bottom of the structure and bear all costs for proper disposal.
- C. Structurally Repair Entire Structure: Clean walls in accordance with Paragraph on Cleaning. Plug any leaks in accordance with the manufacturer's recommendation. If heavy leaks flow after Item C is complete, install bleedlines, as necessary at the bottom of the manhole to reduce the hydrostatic pressure. After pressure is reduced, plug remaining leaks with approved patching mortar as discussed in subparagraph Patching Mortar. Next, plug bleedlines with approved patching mortar and continue waterproofing process. Fill all cracks, holes, and joints that have voids with approved material as listed in Subparagraph Waterproofing/Structural Repair

WET WELL AND VAULT CONSTRUCTION

CA 16-1327
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Material in accordance with the manufacturer's recommendations. Apply waterproofing/structural repair material per manufacturer's recommendations.

- D. Plug Abandoned Line: Plug abandoned sewer pipes with if not shown with concrete length of plug. Install in accordance with manufacturer's recommendations

3.9 FIELD QUALITY CONTROL

A. Hydrostatic Testing:

1. When, in ENGINEER's opinion, the groundwater table is too low to permit visual detection of leaks, hydrostatically test all wet wells.
2. Procedure: Plug inlets and outlets and fill structure with water to height determined by ENGINEER.
3. A wet well may be filled 24 hours prior to time of testing, if desired, to permit normal absorption into the walls to take place.
4. Leakage in each wet well shall not exceed 1.0 gallon per hour per foot of head above the bottom for an 8-foot diameter wet well. Leakage allowances shall be proportional for different wet well diameters.
5. Repair wet wells that do not meet the leakage test, or do not meet specified requirements from visual inspection.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02751
PREPARATORY CLEANING AND ROOT REMOVAL****PART 1 GENERAL****1.1 SCOPE**

- A. This Section covers the preparatory cleaning of sewer lines and manholes as needed prior to the internal survey of the sewer lines by closed-circuit television. It also covers the preparatory cleaning and root removal of sewer lines and the cleaning of manholes prior to rehabilitation. The contractor shall furnish all necessary material, labor, equipment and services required for cleaning the specific sewer lines.
- B. Sewer Line Cleaning. The intent of sewer line cleaning is to remove foreign materials from the lines and restore the sewer to a minimum of 95% of the original carrying capacity or as required for proper seating of internal pipe joint sealing packers or performance of other specified work. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the contractor will not be required to clean those specific sewer sections. If, in the course of normal cleaning operations, damage does result from preexisting and unforeseen conditions such as broken pipe, the contractor will not be held responsible.
- C. The designated sewer sections shall be cleaned using hydraulically propelled, high-velocity jet, or mechanically powered equipment. The equipment shall dislodge, transport and remove all sludge, mud, sand, gravel, rocks, bricks, grease, roots, sticks, and all other debris from the interior of the sewer pipe and manholes. The equipment and methods selected shall be based on the conditions of lines and manholes at the time the work commences and shall be satisfactory to the owner. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, the cleaning effort shall be stopped and sufficient inspection performed so that the owner can be notified of the reason for inability to continue.
- D. During all cleaning and preparation operations all necessary precautions shall be taken to protect the sewer from damage. During these operations, precautions shall also be taken to insure that no damage is caused to public or private property adjacent to or served by the sewer or its branches.
- E. Satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard the flow in the sewer line are used, precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. When possible, the flow of sewage in the sewer shall be utilized to provide the necessary pressure for hydraulic cleaning devices. The contractor shall employ operational hydrant meters to be obtained from the owner, and shall obtain water only from the owner's hydrants. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant.

PART 2 PRODUCT (NOT USED)

Preparatory Cleaning and Root Removal

02751-1

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 3 EXECUTION

3.1 MATERIAL REMOVAL

- A. All sludge, dirt, sand, rocks, grease, roots, and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted.
- B. Under no circumstances shall sludge or other debris removed during these operations be dumped or spilled into the streets, ditches, storm drains or other sanitary sewers. The contractor shall remove from the site and properly dispose of all solids or semi-solids recovered during the cleaning operation. The contractor shall obtain permits and make arrangements as required to properly dispose of solids.
- C. The contractor is advised that he shall not dispose of this material by legal or illegal dumping on private or public property, by sale to others, or any means other than those given above.
- D. The general requirements for vehicles hauling such waste materials are as follows: Transport vehicles must be of type(s) approved for this application by the political jurisdictions involved. General requirements are that the vehicles have watertight bodies, that they be properly equipped and fitted with seals and covers to prohibit material spillage or drainage, and that they be cleaned as often as is necessary to prevent deposit of material on roadways. Vehicles must be loaded within legal weight limits and operated safely within all traffic and speed regulations.
- E. The routes used by the contractor for the conveyance of this material on a regular basis shall be subject to approval by the governing authority having jurisdiction over such routes.
- F. All solids or semisolids resulting from the cleaning operations shall be removed from the site and disposed of by the contractor in a legal and sanitary manner as approved by appropriate authorities, at the contractor's cost. Copies of records of all disposal shall be furnished to the owner, indicating disposal site, date, amount and a brief description of material disposed. All materials shall be removed from the site no less often than at the end of each workday.

3.2 ROOT REMOVAL

- A. Roots shall be removed in the designated sections and manholes where root intrusion is indicated on the work order. Special attention should be exercised during the cleaning operation to assure almost complete removal of roots from the joints. Any roots which could prevent the proper survey or rehabilitation shall be removed. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaners.

3.3 ACCEPTANCE OF CLEANING OPERATION

- A. Acceptance of sewer line cleaning shall be made upon the successful completion of the television survey and shall be to the satisfaction of the owner. Liner installation shall not be initiated until the owner has reviewed the post-cleaning television survey tapes and has accepted the cleaning. If television survey shows the cleaning to be unsatisfactory, the

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

contractor shall be required to reclean and reinspect the sewer line until the cleaning is shown to be satisfactory.

- B. In the event that special cleaning involving the mechanical removal of roots, grease, and/or tuberculation has been authorized, acceptance of sewer line cleaning shall be made upon the successful completion of the post-cleaning television survey and shall be to the satisfaction of the owner. Liner installation shall not be initiated until the owner has reviewed the post-cleaning television surveys and has accepted the cleaning.
- C. In addition, on all those lines which have sags or dips, to an extent that the television camera lens becomes submerged for three (3) or more feet during the television inspection, the contractor shall pull down the water, or draft the water by means of high-velocity jet cleaners. Water removal shall be performed until the television camera lens will no longer submerged. This requirement may be waived by the owner if the water in which the camera lens is submerged, is clear enough to allow the identification of pipe defects, cracks, holes and location of service taps.

- END OF SECTION -

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02761
PAVEMENT MARKING****PART 1 GENERAL****1.01 STANDARD SPECIFICATIONS**

- A. When referenced in this section, shall mean Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition.

1.02 DELIVER, STORAGE, AND PROTECTION

- A. Packaging and Labeling: All coatings and traffic marking materials shall be shipped in strong containers plainly marked with the weight in pounds per gallon, the volume of coatings and traffic marking materials content in gallons, the color, user information, date of manufacture, LOT, batch and DOT code number. Each batch manufactured shall have a unique number. A true statement of the percentage composition of the pigment, the proportion of pigment to vehicle, and the name and address of the manufacturer, also shall be shown. The label shall warn the user of any special handling or precautions of the material, as recommended by the manufacturer. Any package not so marked will not be accepted for use under these Specifications.
- B. Storage: Any coatings and traffic marking materials which, although inspected and approved at the point of manufacture, hardens or livers in the containers so that it cannot be readily broken up with a paddle to a smooth, uniform painting consistency, will be rejected. All materials shall have a container storage life of one year from date of manufacture. Any coatings and traffic marking materials not acceptable for proper application will be rejected, even though it conforms to these Specifications in all other respects.
- C. Mixing: All paints except aluminum shall be delivered to the project completely mixed, and ready to be used without additional oil or thinner. Gasoline shall not be used for thinner under any circumstances.

PART 2 PRODUCTS**2.01 PAINT**

- A. Color: White, yellow, or blue traffic paint meeting the requirements of Section 971 of the Standard Specifications.
- B. Homogeneous, easily stirred to smooth consistency, with no hard settlement or other objectionable characteristics during a storage period of 6 months.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.02 THERMOPLASTIC STRIPING

- A. White or yellow thermoplastic striping material meeting the requirements of Section 971-17 of the Standard Specifications.

2.03 RAISED REFLECTIVE MARKERS

- A. Metallic or nonmetallic, or prismatic reflector type, of permanent colors retaining color and brightness under action of traffic.
- B. Rounded surfaces presenting a smooth contour to traffic. The minimum area of each reflective face shall be 2-1/2 inches squared.
- C. Marker and adhesive epoxy in accordance with ASTM D4280
- D. Markers shall meet the requirements of Section 970 (Class B) of the Standard Specifications.

2.04 GLASS SPHERES

- A. Glass spheres shall be of a composition designed to be highly resistant to traffic wear and to the effects of weathering.
- B. In accordance with AASHTO M247, Type I with moisture resistant coating or a formulation specified by the traffic striping material manufacturer and Section 971-14 of the Standard Specifications.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. Cleaning:
 - 1. Thoroughly clean surfaces to be marked before application of pavement marking material.
 - 2. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water or a combination of these methods.
 - 3. Completely remove rubber deposits, surface laitance, existing paint markings, and other coatings adhering to pavement with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion.
 - 4. Scrub areas of old pavement affected with oil or grease with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application.
 - 5. Surfaces shall be completely free of dry dirt and ice, and dry of water at the time of application of any of the materials specified herein.
 - 6. Oil-Soaked Areas: After cleaning, seal with cut shellac to prevent bleeding through the new paint.
 - 7. Reclean surfaces when Work has been stopped due to rain.
 - 8. Existing Pavement Markings:
 - a. Remove existing pavement markings that may interfere or conflict with newly applied marking patterns, or that may result in a misleading or confusing traffic pattern.

PAVEMENT MARKING

CA 0176-1224
EXHIBIT 4

Page 322 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. Do not apply thermoplastic markings over existing preformed or thermoplastic markings.
 - c. Perform grinding, scraping, sandblasting or other operations so finished pavement surface is not damaged.
- B. Pretreatment for Early Painting: Where early painting is required on rigid pavements, pretreat with an aqueous solution containing 3 percent phosphoric acid and 2 percent zinc chloride.
- C. New Concrete Pavement:
 - 1. Allow a minimum cure time of 30 days before cleaning and marking.
 - 2. Clean by either sandblasting or water blasting to the following results:
 - a. No visible evidence of curing compound on peaks of textured concrete surface.
 - b. No heavy puddled deposits of curing compound in valleys of textured concrete surface.
 - c. Remaining curing compound is intact, with loose and flaking material completely removed.
 - d. Peaks of textured pavement surface are rounded in profile and free of sharp edges and irregularities.
 - 3. Allow a minimum drying time of 24 hours after water blasting before applying thermoplastic markings.

3.02 ALIGNMENT FOR MARKINGS

- A. The Contractor shall be responsible for all measurements, reference points and marks, string lining, and any other steps required in establishing pavement marking locations and alignment. On tangents and on curves up to 1 degree, the alignment of the marking shall not deviate from the string line by more than 1 inch. On curves exceeding 1 degree, the maximum permissible deviation shall be 2 inches. All alignment width and location shall conform to the details shown on the Drawings.

3.03 PAINT APPLICATION

- A. General:
 - 1. Thoroughly mix pigment and vehicle together prior to application, and keep thoroughly agitated during application.
 - 2. Do not add thinner.
 - 3. Apply only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Maintain paint temperature within these same limits.
 - 4. Apply only when surface is dry.
 - 5. Do not apply when conditions are windy to the point of causing overspray or fuzzy line edges.
 - 6. New Asphalt Pavement: Allow a minimum pavement cure time as recommended by the manufacturer before applying paint.
 - 7. Provide guide lines and templates to control paint application.
 - 8. Take special precautions in marking numbers, letters, and symbols.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

9. Sharply outline edges of markings and apply without running or spattering.
- B. Rate of Application:
 1. Reflective Markings:
 - a. Paint: Apply evenly, 105 plus or minus 5 square feet per gallon.
 - b. Glass Beads: Apply uniformly, 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.
 2. Nonreflective Markings: Apply paint evenly to pavement surface at a rate of 105 plus or minus 5 square feet per gallon.
 3. On new pavement or new asphalt surface treatments, apply two coats of paint at a uniform rate of 210 square feet per gallon.
- C. Drying:
 1. Provide maximum drying time to prevent undue softening of bitumen and pickup, displacement, or discoloration by traffic.
 2. If drying is abnormally slow, discontinue painting operations until cause is determined and corrected.

3.04 THERMOPLASTIC MARKING APPLICATION

- A. Following specified surface preparation, prime and apply marking and glass beads to provide a reflectorized strip as shown on Drawings.
- B. The material shall be applied to the pavement by the extrusion method only, wherein one side of extrusion shaping die is the pavement and the other sides are formed by suitable equipment for heating and controlling the flow of the material.
- C. Application Temperatures:
 1. Pavement Surface: Minimum 40 degrees F and rising.
 2. Thermoplastic: Minimum 375 degrees F, maximum 425 degrees F.
- D. Primer:
 1. On portland cement concrete and existing asphalt pavements, apply epoxy resin primer/sealer according to the thermoplastic manufacturer's recommendations.
 2. All primer/sealer to dry prior to applying thermoplastic.
- E. Thermoplastic Marking:
 1. Extrude in a molten state, free of dirt or tint. at a thickness of 0.10 to 0.15 inch for lane lines and 0.07 to 0.10 inch for edge or other lines in accordance with FDOT 711-4.3.
 2. Apply centerline, skipline, edgeline, and other longitudinal type markings with a mobile applicator.
 3. Apply special markings, crosswalks, stop bars, legends, arrows, and similar patterns with a portable, extrusion-type applicator.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

F. Glass Bead Application:

1. Immediately after marker application, mechanically apply such that the beads are held by and imbedded in the surface of the molten material.
2. Application Rate: One pound per 20 square feet of compound.

G. Cool completed marking to ambient temperature prior to allowing vehicular traffic.

3.05 INSTALLATION OF RAISED REFLECTIVE MARKERS

- A. Apply markers to the bonding surface using bituminous adhesives only.
- B. Apply the adhesive to the binding surface (not the marker) so that 100 percent of the bonding area of the marker will be covered.
- C. Align markers carefully, projecting no more than 3/4-inch above level of pavement. Reflective face of the marker shall be perpendicular to a line parallel to the roadway centerline. Do not install markers over longitudinal or transverse joints of the bonding surface.
- D. Spacing: As shown on the Drawings.
- E. Immediately remove excess adhesive from the bonding surface and exposed surface of the marker.
- F. Use only a mineral spirits meeting Federal Specifications TT-T-291 to remove adhesive from exposed faces of markers.

3.06 GLASS BEAD APPLICATION

- A. Apply immediately following application of paint.
- B. Use evenly distributed, drop-on application method.
- C. Rate: 10 pounds per gallon of paint.

3.07 PROTECTION

- A. The CONTRACTOR shall erect adequate warning signs and/or provide sufficient number of flagmen, and take all necessary precautions for the protection of the materials and safety of the public.
- B. Protect surfaces from disfiguration by paint spatters, splashes, spills, or drips.

3.08 CLEANUP

- A. Remove paint spatters, splashes, spills, or drips from Work and staging areas and areas outside of the immediate Work area where spills occur.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SECTION 02765
CURED-IN-PLACE PIPE LINING

PART 1 GENERAL

1.1 SCOPE

- A. It is the intent of this specification to provide for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube which is formed to the original conduit and cured to produce a continuous and tight fitting Cured-In-Place Pipe (CIPP).
- B. The work specified in this Section includes all labor, materials, accessories, equipment and tools necessary to install and test cured-in-place pipe lining in main lines and in service laterals.

1.2 GENERAL

- A. This specification references ASTM F1216 (Rehabilitation of pipelines by the inversion and curing of a resin-impregnated tube), ASTM F1743 (Rehabilitation of pipelines by pulled-in-place installation of a cured-in-place thermosetting resin pipe), and ASTM D790 (Test methods for flexural properties of unreinforced plastics) which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and these referenced documents, this specification will govern.

1.3 SUBMITTALS

- A. The CONTRACTOR shall submit shop drawings and other information to the OWNER for review in accordance with Section 01300, "Submittals".
- B. With the bid, the following submittals are required.
 - 1. Documentation as outlined herein under the section titled, PRODUCT AND INSTALLER ACCEPTABILITY, including installation references of projects that are similar in size and scope to this project. The submittal shall include, at a minimum, the client contact name, phone number, and the diameter and footage of pipe rehabilitated. Documentation for product and installation experience must be satisfactory to the OWNER.
- C. After contract award, the following submittals are required.
 - 1. Detailed design calculations as specified herein under the section titled, MATERIALS FOR MAIN LINES.
 - 2. Various test results as specified herein under the section titled, TESTING REQUIREMENTS.
 - 3. Documentation as specified herein under the sections titled WET-OUT AND CURE REPORT and TELEVISION SURVEY.

Cured-In-Place Pipe Lining

02765-1

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.4 PRODUCT AND INSTALLER ACCEPTABILITY

- A. Since sewer products are intended to have a 50 year design life, and in order to minimize the OWNER'S risk, only proven products and installers with substantial successful long term track records will be approved.
- B. Products and installers seeking approval must document an ability to meet all of the following criteria to be deemed commercially acceptable:
 - 1. For a product to be considered commercially proven, a minimum of 1,000,000 linear feet or 4,000 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the OWNER to assure commercial viability. In addition, at least 500,000 linear feet of the product shall have been in successful service within the State of Florida for a minimum of five years.
 - 2. For an Installer to be considered as commercially proven, the installer must satisfy all insurance, financial, and bonding requirements of the OWNER, and must have had at least 5 (five) years active experience in the commercial installation of the product in Florida. For sewer mains, the installer must have successfully installed at least 500,000 feet of the product in wastewater collection systems in Florida.
 - 3. Sewer rehabilitation products submitted for approval must provide third party test results supporting the long term performance and structural strength of the product and such data shall be satisfactory to the OWNER. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved without independent third party testing verification.

PART 2 PRODUCTS

2.01 MATERIALS FOR MAIN LINES

- A. The sewn tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge breaks and missing sections of the existing pipe, and stretch to fit irregular pipe sections. The new jointless pipe-within-a-pipe must fit tightly against the old pipe wall and consolidate all disconnected sections into a single continuous conduit, substantially reducing or eliminating infiltration or exfiltration.
- B. The wetout tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the Design thickness.
- C. The tube shall be sewn to a size that when installed will tightly fit the internal circumference and length of the original pipe with minimal shrinkage, in such a way as to minimize water migration (tracking) between the liner and the host pipe. Allowance should be made for circumferential stretching during inversion, and longitudinal

Cured-In-Place Pipe Lining

02765-2

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

stretching during pull in. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.

- D. The minimum tube length shall be that deemed necessary by the Contractor to effectively span the distance between the access points and to facilitate a good, "non-tracking" seal. The Contractor shall verify the lengths in the field before cutting liner to length and otherwise preparing it for installation.
- E. The outside layer of the tube (before wetout) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wetout) procedure.
- F. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
- G. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
- H. Seams in the tube shall be stronger than the unseamed felt.
- I. The outside of the tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol. The tubes must be manufactured in the USA.
- J. Contractor is to install Hydrophilic End Seals at all manhole penetrations. The End Seals must be in a tubular form which when installed will form a 360 degree seal between the host pipe and the newly installed liner and must be a minimum of three inches wide. The use of caulking, rope or band type of an end seal will not be allowed. Acceptable End Seals are Insignia™ End Seals by LMK Enterprises, 1779 Chessie Lane, Ottawa, IL 61350 (815) 433-1275, or pre-approved equal.
- K. If the end of the host pipe is cracked or otherwise damaged at the connection to the manhole such that a watertight fit cannot be achieved solely through the use of Insignia End Seals, the Contractor shall use AV-202 multigrout or approved equal in addition to the Insignia End Seals to fill all gaps until a watertight fit between the host pipe and the liner is achieved.
- L. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification.
- M. The finished pipe in place shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage. All constituent materials will be suitable for service in the environment intended. The final product will not deteriorate, corrode or lose structural strength that will reduce the projected product

Cured-In-Place Pipe Lining

02765-3

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

life. In industrial areas a liner system using epoxy vinyl ester resin shall be utilized and a polyester resin shall be used in non-industrial areas. The OWNER shall determine the type of appropriate resin to be utilized for each line segment.

- N. The CIPP shall be designed as per ASTM F1216, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall. The structural performance of the finished pipe must be adequate to accommodate all anticipated loads throughout its design life.
- O. The CIPP must have a minimum design life of fifty (50) years. The minimum design life may be documented by submitting life estimates by national and/or international authorities or specifying agencies. Otherwise, long-term testing and long-term in-service results (minimum ten (10) years) may be used, with the results extrapolated to fifty (50) years.
- P. The CONTRACTOR must have performed long-term testing for flexural creep of the CIPP pipe material installed by his company. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D-790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Values in excess of 50% will not be applied unless substantiated by qualified third party test data. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in design.
- Q. The minimum required structural CIPP wall thickness shall be based on the physical and structural properties described herein and in accordance with the design equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design <i>(as determined by Long-Term tests described in paragraph 2.02.B)</i>	50 %
Ovality*	2 %
Water Table = Grade Elevation	ft.
Soil Depth (above crown)*	ft.
Soil Modulus	700 psi
Soil Density	120 pcf
Live Load	Two H20 passing trucks
Design Condition	Fully deteriorated
*Denotes information which can be provided here or in inspection video tapes or project construction plans. Multiple line segments may require a table of values.	

- R. The lining manufacturer shall submit to the OWNER for review complete design calculations for the liner, signed and sealed by a Professional Engineer registered in the State of Florida and certified by the manufacturer as to the compliance of his materials to the values used in the calculations. The buckling analysis shall account for the combination of dead load, live load, hydrostatic pressure and grout pressure (if any).

Cured-In-Place Pipe Lining

02765-4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

The liner side support shall be considered as if provided by soil pressure against the liner. The existing pipe shall not be considered as providing any structural support. Modulus of soil reaction shall be 700, corresponding to a moderate degree of compaction of bedding and a fine-grained soil as shown in AWWA Manual M45, Fiberglass Pipe Design.

- S. As part of the design calculation submittal, the liner manufacturer shall submit a tabulation of time versus temperature. This tabulation shall show the lengths of time that exposed portions of the liner will endure without self-initiated cure or other deterioration beginning. This tabulation shall be at five degree Fahrenheit increments ranging from 70 degrees F to 100 degrees F. The manufacturer shall also submit his analysis of the progressive effects of such "pre-cure" on the insertion and cured properties of the liner. This information shall be submitted in a timely fashion prior to the preconstruction conference so that the OWNER may set procedures for dealing with such an instance caused by construction delays.
- T. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.
- U. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.
- V. Liner shall be neither accepted nor installed until design calculations are acceptable to the OWNER. Liner shall be as manufactured by Inliner Technologies, Insituform, or National liner, or approved equal.

2.2 STRUCTURAL REQUIREMENTS FOR MAIN LINES

- A. Since the pipe strength is related to the uniformity and density of the pipe wall, only resin vacuum impregnation will be allowed. Resin impregnation without vacuum entraps air and creates voids which weaken the pipe wall. If reinforcing materials (fiberglass, etc.) are used, the reinforcing material must be fully encapsulated within the resin to assure that the reinforcement is not exposed, either to the inside of the pipe or at the interface of the CIPP and the existing pipe.
- B. The design for the CIPP wall thickness will be based on the following strengths, unless otherwise submitted to and approved by the OWNER.

<u>Property</u>	<u>Test Method</u>	<u>Cured Composite per ASTM F1216</u>
Flexural Modulus of Elasticity	ASTM D-790	250,000 psi
Flexural Stress	ASTM D-790	4,500 psi

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.3 TESTING REQUIREMENTS

- A. Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
- B. Hydraulic Capacity - Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall provide at least 100 percent of the flow capacity of the original pipe before rehabilitation. In lieu of actual measurements, calculated capacities may be derived using commonly accepted equations and values of the Manning flow coefficients (designated "n" coefficients). The original pipe material and condition at the time of reconstruction will determine the Manning coefficient used in the host pipe. A Manning coefficient of 0.009 for a jointless, relatively smooth-wall cured-in-place pipe will be used for the lateral CIPP flow calculation.
- C. CIPP Field Samples - When requested by the OWNER, the CONTRACTOR shall submit test results from field installations in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified herein have been achieved in previous field applications.
- D. Prior to any liner installation, the CONTRACTOR shall submit technical data sheets showing the physical and chemical properties and infrared spectrum analysis per ASTM E1252 (chemical fingerprint) of the proposed resin system as modified for the cured-in-place process. Additionally, copies of the certificates of analysis for resin used on the project must be made available to the OWNER. The CONTRACTOR shall test each lot of resin used by conducting infrared spectrum analyses on field samples. These analyses shall be conducted at the CONTRACTOR's expense.
- E. The CONTRACTOR shall provide resin samples as directed by the OWNER during the duration of the project and infrared spectrography chemical fingerprints shall be run and compared to the submitted fingerprint to verify the resin used is the resin submitted for use on this project. These analyses shall be conducted at the OWNER's expense.
- F. In the case of liner installation performed under this contract, CIPP samples shall be prepared and physical properties tested in accordance with ASTM F1216 or ASTM F1743, Section 8, using either method proposed.
 - 1. The CONTRACTOR shall submit a method to the OWNER, for approval, to obtain representative samples from the installed liners. These samples will be tested by the OWNER, at the OWNER's expense, to verify compliance with the installed material specifications. The CONTRACTOR shall produce these test samples when so directed by the OWNER. The OWNER reserves the right to request samples from as many as 10 percent of the liners installed, unless a pattern of failure occurs. In this case, the CONTRACTOR will be requested to provide a greater quantity of samples, up to 100 percent, at no additional cost, and the CONTRACTOR shall bear all costs of this additional testing. Liners which do not pass these material tests will be accepted at reduced payment or rejected pursuant to Section 01025.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. The cost for sample collection shall be included in the bid price for rehabilitation.
3. Test specimens shall be marked in indelible ink with the appropriate lateral or main section, work order number, date of installation, and orientation to the top of the pipe (direction of up) so the results can be correlated to the field work performed. All test results shall use this designated labeling as a reference.
4. The extraction and labeling of test specimens shall be done in the presence of the OWNER. The OWNER and CONTRACTOR shall, upon completion of sample extraction and labeling, both sign a chain-of-custody form that shall subsequently accompany the sample at all times and shall ultimately be received and signed at the testing laboratory. Test reports shall include a copy of the chain-of-custody form with all signatures to ensure that reported test results are for the correct sample.
5. The flexural properties must meet or exceed the values specified herein.
6. Wall thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743.
7. Visual inspection of the CIPP shall be by closed-circuit television.

PART 3 EXECUTION

3.1 CLEANING/SURFACE PREPARATION

- A. It shall be the responsibility of the CONTRACTOR to clean the pipeline with a high-pressure water jet and to remove all internal debris out of the pipeline in accordance with Section 02751, "Cleaning and Root Removal".

3.2 SEWER REPAIRS

- A. Any protruding pieces of concrete, dropped joints or broken pipe shall be subjected to point repairs so that the pipe is left in a clean smooth condition in all respects ready for lining, unless otherwise jointly determined by the Contractor and the OWNER that the defect will not compromise the integrity of the liner.
- B. If conditions such as broken pipe and major blockages are found that will prevent proper cleaning, or where additional damage would result if cleaning is attempted or continued, the CONTRACTOR, with the advance concurrence of the OWNER, shall perform the necessary point repair(s), and then complete the cleaning.

3.3 JOINT, CRACK, ANNULAR SPACE, AND LINER END CHEMICAL SEALING

- A. Prior to cured-in-place liner installation, all active leaks of a magnitude to compromise the integrity of the liner shall be stopped using chemical grout, at no additional cost to the OWNER.
- B. Materials used on this Project shall have the following properties: react quickly to form a permanent watertight seal; resultant seal shall be flexible and immune to the effects of wet/dry cycles; non-biodegradable and immune to the effects of acids, alkalis, and

Cured-In-Place Pipe Lining

02765-7

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

organics in sewage; component packaging and mixing compatible with field conditions and worker safety; extraneous sealant left inside pipe shall be readily removable; and shall be compatible with the CIPP liner resin system utilized. The chemical sealing materials shall be acrylic resin type and shall be furnished with activators, initiators, inhibitors and any other materials recommended by the manufacturer for a complete grout system. Sealing grout shall be furnished in liquid form in standard manufacturer's containers. Sealing grout shall be AV-202 manufactured by Avanti International, Houston, Texas (1-800-877-2570), or approved equal.

- C. The Contractor shall modify his equipment as necessary to seal the leaks, however both his equipment and sealing method must meet the approval of the OWNER prior to use. Extreme caution shall be utilized during leak sealing (pressure) operations in order to avoid damaging the already weakened sewer pipe. If any damage occurs, it shall be repaired at the CONTRACTOR's cost and to the satisfaction of the OWNER. Excessive pumping of grout which might plug a service lateral shall be avoided. Any service laterals blocked by the grouting operation shall be cleared immediately by the Contractor.

3.4 FLOW CONTROL

- A. Flow control shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the sewer under repair. See Section 02750, "Wastewater Flow Control" for additional information.

3.5 LINER INSTALLATION FOR MAIN LINES

- A. The pre-lining video of the prepared pipe shall be reviewed and be acceptable to the OWNER for cleanliness and smoothness before the CONTRACTOR begins to line the pipe.
- B. The CONTRACTOR shall present to the OWNER, for review, a description of his methods for avoiding liner stoppage due to conflict and friction with such points as the manhole entrance and the bend into the pipe entrance. He shall also present plans for dealing with a liner stopped by snagging within the pipe. This information shall be rendered to the OWNER in a timely fashion prior to the preconstruction conference.
- C. The CONTRACTOR shall immediately notify the OWNER of any construction delays taking place during the insertion operation. Such delays shall possibly require sampling and testing by an independent laboratory of portions of the cured liner at the OWNER's discretion. The cost of such test shall be borne by the CONTRACTOR and no extra compensation will be allowed. Any failure of sample tests or a lack of immediate notification of delay shall be automatic cause for rejection of that part of the work at the OWNER's discretion.
- D. The CONTRACTOR shall designate a location where the tube will be impregnated with resin prior to installation. The CONTRACTOR shall allow the OWNER and/or OWNER to inspect the materials and the "wet-out" procedure.
- E. The CONTRACTOR shall submit construction schedules for advance approval by the OWNER. At no time will any service lateral remain inoperative for more than an eight (8)-hour period. Any service that will be out of service for more than eight (8) hours will

Cured-In-Place Pipe Lining

02765-8

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

be temporarily by-passed into a mainline sanitary sewer, at the CONTRACTOR's expense.

- F. The materials and processes must be reasonably available for pre-installation, installation and post-installation inspections. Areas which require inspection include, but are not limited to, the following:
1. Product materials should exhibit sufficient transparency to visually verify the quality of resin impregnation.
 2. Temperature sensing devices, such as thermocouples, shall be located between the existing pipe and the CIPP to ensure the quality of the cure of the wall laminate.

3.6 LINER INSTALLATION FOR MAIN LINES

- A. After the inversion is complete, the CONTRACTOR shall supply a suitable heat source and water recirculation equipment to circulate heated water throughout the pipeline. The equipment shall be capable of delivering hot water throughout the pipeline to uniformly raise the water temperature to a level required to effectively cure the resin. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. Another such gage shall be placed between the tube and the host pipe at the termination end at or near the bottom to determine the temperatures during cure. Water temperature in the pipe during the cure period shall be as recommended by the resin manufacturer.
- B. Initial cure shall be deemed complete when the exposed portions of the tube appear to be hard and sound and the temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer and may require continuous recirculation of the water to maintain the temperature. The CONTRACTOR shall have on hand at all times, for use by his personnel and the OWNER, a digital thermometer or other means of accurately and quickly checking the temperature of exposed portions of the liner.
- C. CIPP installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with modifications as listed herein.
- D. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used. To insure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction. After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the same results. Any alternate resin impregnation method must be proven.
- E. Tube Insertion: The wetout tube shall be positioned in the pipeline using either inversion or a pull-in method. If pulled into place, a power winch should be utilized and care

Cured-In-Place Pipe Lining

02765-9

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

should be exercised not to damage the tube as a result of pull-in friction. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.

- F. Temperature gauges shall be placed inside the tube at the invert level of each end to monitor the temperatures during the cure cycle.
- G. Curing shall be accomplished by utilizing hot water under hydrostatic pressure in accordance with the manufacturer's recommended cure schedule.
- H. Cooldown: The CONTRACTOR shall cool the hardened pipe to a temperature below 100 F before relieving the hydrostatic head. Cooldown may be accomplished by the introduction of cool water into the inversion standpipe to replace water being pumped out of the manhole. Care should be taken in release of static head so that vacuum will not be developed that could damage the newly installed liner.
- I. Finish: The new pipe shall be cut off in the manhole at a suitable location. The finished product shall be continuous over the length of pipe reconstructed and be free from dry spots, delamination and lifts. Should the liner not make a tight seal at the inside manhole wall, a watertight seal shall be made by use of extra polyester fiber felt and epoxy resin. Pipe entries and exists shall be smooth, free of irregularities, and watertight. No visible leaks shall be present and the CONTRACTOR shall be responsible for grouting to remove leaks or fill voids between the host pipe and the liner. 100% of all lateral reconnections, drop connections and manhole connections are to be chemically grouted. During the warranty period, any defects which will affect the integrity or strength of the product shall be repaired at the CONTRACTOR's expense, in a manner mutually agreed upon by the OWNER and the CONTRACTOR.

3.7 REINSTATEMENT OF SERVICE LATERALS, BRANCH CONNECTIONS, AND DROP MANHOLE CONNECTIONS

- A. After the pipe has been cured in place, the CONTRACTOR shall reconnect the existing service connections. This shall be done from the interior of the pipeline without excavation using a robotic cutter. Where holes are cut through the liner, they shall be neat and smooth in order to prevent blockage at the service connections. Cut-in service connections shall be opened to a minimum of 95 percent of the flow capacity of the building sewer. Cuts shall be wire-brushed to remove jagged edges. All coupons shall be recovered at the downstream manhole and removed. The CONTRACTOR shall stop all visible leaks, including at service connections. All reinstated service lateral connections (between the liner and the existing pipe) shall be grouted. Grouting of service laterals is considered incidental to the lateral reinstatement and shall not be a separate pay item.
- B. The CONTRACTOR shall seal all laterals after the reinstatements are 100% cut and brushed. The sealing is to be in compliance with ASTM F2454. The lateral sealing area is to include the first joint or 18" into the lateral pipe whichever is more. A test is necessary after the annular space is sealed in keeping with the ASTM Standard. If the test fails any resealing will be done at the expense of the contractor. All grout sealing required (lateral connections and manholes penetrations) are to be 100% complete before the final video is done to document that the completed section is ready to be submitted for payment. The final video must show the entire surface of the lateral (pan

Cured-In-Place Pipe Lining

02765-10

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

the lateral) and the up and down stream manhole connections. During the sealing and testing of the lateral connections the contractor is to have an inspector present to document the procedure. The contractor is also directed to video tape the seal and completed testing as follows. To be paid for a lateral reinstatement the video must show 1) a 5 second video prior to sealing, 2) a 15 second video of the test pressure showing the lateral passed the pressure test. The screen must have the lift station number, manhole to manhole numbers and the station footage of the lateral on the main. The video must not run the entire time, just as described above.

- C. It is the intent of these specifications that service laterals be reopened without excavation, utilizing a remote controlled cutting device, monitored by a video TV camera. The Contractor shall certify he has a minimum of 2 complete working cutters plus spare key components on the site before each liner installation. No additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.
- D. Unless otherwise directed by the OWNER, all laterals will be reinstated. The OWNER will provide specific direction concerning any laterals that will be abandoned and will therefore not require reinstatement. The CONTRACTOR shall abandon a lateral by not reinstating the lateral only with consent of the OWNER. A record of all laterals not reinstated shall be provided to the Inspector at the end of each day.
- E. The language in this section applies equally to branch connections and drop manhole connections.

3.8 ACCEPTANCE

- A. The finished liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, and the like. No pinholes, cracks, thin spots, dry spots, or other defects in the liner will be permitted. There shall be no visible infiltration through the liner or from behind the liner at manholes and service connections. Cut-ins and attachments at service connections shall be neat and smooth.
- B. Ridges or wrinkles in the installed liner shall be accepted or rejected at the sole discretion of the OWNER. If, in the opinion of the OWNER, such defects could cause structural weakening of the liner, impede the progress of a camera during internal television inspection, or encourage solids deposition and potential interruptions to flow, such defects shall be corrected at the CONTRACTOR's expense in a manner acceptable to the OWNER.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.9 WET-OUT AND CURE REPORT

- A. The CONTRACTOR shall submit "wet out" and "cure" reports documenting the specific details of the liner's vacuum impregnation and saturation with resin and the CIPP installation of the liner. A copy of all "wet out" and "cure" records shall be made available to the OWNER upon request, and shall be turned over to the OWNER on a weekly basis and prior to request for payment. If the "wet out" and "cure" reports are not presented prior to a payment request for a repair work order, payment for the work will not be made and the request will be rejected. At a minimum, this report shall include, in addition to CONTRACTOR and Contract identification:

1. Line identification and location
2. Wet-out date
3. Sample identification(s) and technician
4. Installation (in sewer) date
5. Host sewer pipe inside diameter
6. Liner thickness
7. Liner length
8. Liner and resin batch numbers
9. Resin type
10. Wet out length
11. Quantity of resin and catalyst utilized
12. Wet out technicians
13. Time wet out started and completed
14. Applicable remarks
15. Boiler and liner heating fluid pressure and temperature versus time log during cure period
16. Cool down report

3.10 CLEANUP

- A. After the liner installation has been completed and accepted, the CONTRACTOR shall cleanup the entire project area and return the ground cover to the original or better

Cured-In-Place Pipe Lining

02765-12

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

condition. All excess material and debris not incorporated into the permanent installation shall be disposed of by the CONTRACTOR.

3.11 TELEVISION SURVEY

- A. Television survey, including Preconstruction Survey, Post Construction Survey, as indicated in Section 02752 "Television Survey", is required for all cured-in-place lining, including main lines and service laterals, and shall be completed and submitted for Owners review within 2 weeks of liner installation.

3.12 PUBLIC NOTIFICATION

- A. The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be out of service, the maximum amount of time of no service shall be 8 hours for any property served by the sewer. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:
 - 1. Whether or not an interruption in service is expected, written notice to be delivered to each home or business the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor the home or business can call to discuss the project or any problems which could arise.
 - 2. Personal contact with any home or business which cannot be reconnected within the time stated in the written notice.

3.13 WARRANTY

- A. The liner shall be certified by the manufacturer for specified material properties for a particular job. The manufacturer warrants the liner to be free from defects in raw materials for five year from the date of acceptance. During the warranty period, any defects which affect the integrity or strength of the pipe shall be repaired at the CONTRACTOR's expense in a manner mutually agreed by the OWNER and the CONTRACTOR.
- B. The CONTRACTOR warrants his work to be sealed tight at each end of the liner, drop connections, and also at each service connection for a period of five years.

– END OF SECTION –

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02771
CONCRETE CURBS AND SIDEWALKS****PART 1 GENERAL (NOT USED)****PART 2 PRODUCTS****2.01 EXPANSION JOINT FILLER**

- A. 1/2-inch thick, preformed asphalt-impregnated, expansion joint material meeting AASHTO M153 Type I, II, or III, or AASHTO M213, or cellulose fiber types meeting the requirements of AASHTO M213, except the asphalt content is acceptable provided they contain minimum of 0.2 percent copper pentachlorophenate as a preservative and 1 percent water proofing wax.

2.02 CONCRETE

- A. Ready-mixed meeting ASTM C94, Option A, with compressive strength of 3,000 psi at 28 days.
- B. Maximum Aggregate Size: 1-1/2 inch.
- C. Slump: 2 to 4 inches.

2.03 CURING COMPOUND

- A. Liquid membrane-forming, clear or translucent, suitable for spray application and meeting ASTM C309, Type 1.

PART 3 EXECUTION**3.01 FORMWORK**

- A. Lumber Materials:
 - 1. 2-inch dressed dimension lumber, or metal of equal strength, straight, free from defects that would impair appearance or structural quality of completed curb and sidewalk.
 - 2. 1-inch dressed lumber or plywood may be used where short-radius forms are required.
- B. Metals: Steel in new undamaged condition.
- C. Setting Forms:
 - 1. Construct forms to shape, lines, grades, and dimensions.
 - 2. Stake securely in place.
- D. Bracing:
 - 1. Brace forms to prevent change of shape or movement resulting from placement.

CONCRETE CURBS AND SIDEWALKS

CA02771-1224
EXHIBIT 4
Page 339 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Construct short-radius curved forms to exact radius.

E. Tolerances:

1. Do not vary tops of forms from gradeline more than 1/8 inch when checked with 10-foot straightedge.
2. Do not vary alignment of straight sections more than 1/8 inch in 10 feet.

3.02 PLACING CONCRETE

- A. Excavate to the required depth, place and compact limerock base rock as specified in Section 02710, Limerock Base. Compact directly under the area and 1 foot beyond each side of the sidewalk and curb.
- B. Prior to placing concrete, remove water from excavation and debris and foreign material from forms.
- C. Place concrete as soon as possible, and within 1-1/2 hours after adding cement to mix without segregation or loss of ingredients, and without splashing.
- D. Place, process, finish, and cure concrete in accordance with applicable requirements of ACI 304, and this section. Wherever requirements differ, the more stringent shall govern.
- E. To compact, vibrate until concrete becomes uniformly plastic.
- F. All edges shall be smooth and rounded.

3.03 CURB CONSTRUCTION

- A. Construct ramps at pedestrian crossings.
- B. Expansion Joints: Place at maximum 20-foot intervals and at the beginning and end of curved portions of curb, and at connections to existing curbs. Install expansion joint filler at each joint.
- C. Curb Facing: Do not allow horizontal joints within 7 inches from top of curb.
- D. Contraction Joints:
 1. Maximum 10-foot intervals in curb.
 2. Provide open joint type by inserting thin, oiled steel sheet vertically in fresh concrete to force coarse aggregate away from joint.
 3. Insert steel sheet to full depth of curb.
 4. Remove steel sheet with sawing motion after initial set has occurred in concrete and prior to removing front curb form.
 5. Finish top of curb with steel trowel and finish edges with steel edging tool.
- E. Front Face:

CONCRETE CURBS AND SIDEWALKS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Remove front form and finish exposed surfaces when concrete has set sufficiently to support its own weight.
 2. Finish formed face by rubbing with burlap sack or similar device to produce uniformly textured surface, free of form marks, honeycomb, and other defects.
 3. Remove and replace *defective* concrete.
 4. Apply curing compound to exposed surfaces of curb upon completion of finishing.
 5. Continue curing for minimum of 5 days.
- F. Backfill curb with earth upon completion of curing period, but not before 7 days has elapsed since placing concrete.
1. Backfill shall be free from rocks 2 inches and larger and other foreign material.
 2. Compact backfill firmly.

3.04 SIDEWALK CONSTRUCTION

- A. Thickness:
1. 4 inches in walk areas.
 2. 6 inches in driveway and commercial areas.
- B. Connection to Existing Sidewalk:
1. Remove old concrete back to an existing contraction joint.
 2. Clean the surface.
 3. Apply a neat cement paste immediately prior to placing new sidewalk.
- C. Expansion Joints: Place at maximum 20-foot intervals, at adjacent curb expansion joint, where sidewalk ends at curb, and around posts, poles, or other objects penetrating sidewalk. Install expansion joint filler at each joint.
- D. Contraction Joints:
1. Provide transversely to walks at locations opposite contraction joints in curb.
 2. Dimensions: 3/16-inch by 1-inch weakened plane joints.
 3. Construct straight and at right angles to surface of walk.
- E. Finish:
1. Broom surface with fine-hair broom at right angles to length of walk and tool at edges, joints, and markings.
 2. Ensure that the surface variations are not more than 1/4 inch under a 10-foot straightedge, or more than 1/8 inch on a 5-foot transverse section.
 3. Mark walks transversely at 5-foot intervals, or in pattern shown on Drawings, with jointing tool; finish edges with rounded steel edging tool.
 4. Apply curing compound to exposed surfaces upon completion of finishing.
 5. Protect sidewalk from damage and allow to cure for at least 7 days.

CONCRETE CURBS AND SIDEWALKS

CA 01671223
EXHIBIT 4

Page 341 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

END OF SECTION

CONCRETE CURBS AND SIDEWALKS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02772
ASPHALT CONCRETE PAVEMENT****PART 1 GENERAL****1.01 STANDARD SPECIFICATIONS**

- A. When referenced in this Section shall mean Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition.

1.02 QUALITY ASSURANCE

- A. Qualifications:
1. Independent Testing Laboratory: In accordance with ASTM E329.
 2. Asphalt concrete mix formula shall be prepared by an approved certified independent laboratory under the supervision of a certified asphalt technician.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 10 degrees C (50 degrees F), or air temperature is lower than 4 degrees C (40 degrees F). Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.
- B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Prime Coat: Cut-back asphalt, Grades RC-70 or RC-250 meeting the requirements of Section 916-2 of the Standard Specifications.
- B. Tack Coat: Emulsified asphalt, Grade RS-2, SS-1, or SS-1H meeting the requirements of Section 916-4 of the Standard Specifications. The bituminous material shall be heated to a suitable consistency as directed by the Engineer.
- C. Sand (Blotter Material): Clean, dry, with 100 percent passing a 4.75 mm (No. 4) sieve, and a maximum of 10 percent passing a 75 mm (No. 200) sieve.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.02 ASPHALT CONCRETE MIX

A. General:

1. Mix formula shall not be modified except with the written approval of Engineer.
2. Source Changes:
 - a. Should material source(s) change, establish a new asphalt concrete mix formula before the new material(s) is used.
 - b. Perform check tests of properties of the plant-mix bituminous materials on the first day of production and as requested by Engineer to confirm that properties are in compliance with design criteria.
 - c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.

B. Asphalt Concrete: Type S-III or SP-9.5 (coarse) meeting the requirements in Section 334 of the Standard Specifications.

C. Composition: Hot-plant mix of aggregate, mineral filler, and paving grade asphalt cement. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the mix formula.

D. Aggregate:

1. The aggregate shall meet the requirements in Section 334 of the Standard Specifications.
 - a. Mineral Filler shall meet the requirements of Section 917 of the Standard Specifications

E. Asphalt Cement: Paving Grade AC-30 meeting the requirements of Section 916 of the Standard Specifications.

PART 3 EXECUTION

3.01 GENERAL

- A. Traffic Control: Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.
- B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.02 LINE AND GRADE

- A. Provide and maintain intermediate control of line and grade, independent of the underlying base to meet finish surface grades and minimum thickness.
- B. Shoulders: Construct to line, grade, and cross-section shown.

ASPHALT CONCRETE PAVEMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.03 PREPARATION

- A. Prepare subgrade as specified in Section 02319, Subgrade Preparation.
- B. Existing Roadway:
 - 1. Modify profile by grinding, milling, or overlay methods as approved, to provide meet lines and surfaces and to produce a smooth riding connection to existing facility.
 - 2. Resurface entire roadway following adjustment of base and asphalt grades.
 - 3. Paint edges of meet line with tack coat prior to placing new pavement.
- C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.04 PAVEMENT APPLICATION

- A. General: Place asphalt concrete mixture on an approved, prepared base in conformance with this Section.
- B. Prime Coat:
 - 1. Heat cut-back asphalt between 100 degrees F and 150 degrees F prior to application.
 - 2. Apply uniformly to clean, dry surfaces. Avoiding overlapping of applications.
 - 3. Do not apply when moisture content of upper 3 inches of base exceeds optimum moisture content of base, or if free moisture is present.
 - 4. Application Rate: Minimum 0.1 gallons per square yard of surface area.
 - 5. Remove or redistribute excess material.
 - 6. Allow a minimum of 5 full days for curing of primed surface before placing asphalt concrete.
- C. Tack Coat:
 - 1. Apply uniformly to clean, dry surfaces. Avoiding overlapping of applications.
 - 2. Do not apply more tack coat than necessary for the day's paving operation.
 - 3. Touch up missed or lightly coated surfaces and remove excess material.
 - 4. Application Rate:
 - a. Minimum 0.05 gallons to maximum 0.12 gallons of asphalt (residual if diluted emulsified asphalt) per square yard of surface area.
 - b. Apply at rate, within range specified, sufficient to assure good bonding, but not so heavy that surplus asphalt flushes into asphalt concrete being placed.
- D. Pavement Mix:

ASPHALT CONCRETE PAVEMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Prior to Paving:
 - a. Sweep primed surface free of dirt, dust, or other foreign matter.
 - b. Patch holes in primed surface with asphalt concrete pavement mix.
 - c. Blot excess prime material with sand.
 2. Place asphalt concrete pavement mix in lifts as shown.
 3. Compacted Lift Thickness:
 - a. Minimum: Twice the maximum aggregate size, but in no case less than 3/4 inch. Minimum thickness for Type S-111 and SP-9.5 is 1.5 inches.
 - b. Maximum: 4 inches.
 4. Total Compacted Thickness: As shown.
 5. Apply such that meet lines are straight and edges are vertical.
 6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
 7. Joints:
 - a. Offset edge of each layer a minimum of 6 inches so joints are not directly over those in underlying layer.
 - b. Offset longitudinal joints in roadway pavements, so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.
 - c. Form transverse joints by cutting back on previous day's run to expose full vertical depth of layer.
 8. Succeeding Lifts: Apply tack coat to pavement surface between each lift.
 9. After placement of pavement, seal meet line by painting a minimum of 6 inches on each side of the joint with cut-back or emulsified asphalt. Cover immediately with sand.
- E. Compaction:
1. Roll until roller marks are eliminated and compacted to 100 percent of the laboratory compacted mixture.
 2. Joint Compaction:
 - a. Place top or wearing layer as continuously as possible.
 - b. Pass roller over unprotected end of freshly laid mixture only when placing of mix is discontinued long enough to permit mixture to become chilled.
 - c. Cut back previously compacted mixture when Work is resumed to produce a slightly beveled edge for full thickness of layer.
 - d. Cut away waste material and lay new mix against fresh cut.
- F. Tolerances:
1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.
 2. Completed Surface or Wearing Layer Smoothness:
 - a. Uniform texture, smooth, and uniform to crown and grade.
 - b. Maximum Deviation: 1/8 inch from lower edge of a 12-foot straightedge, measured continuously parallel and at right angle to centerline.
 - c. If surface of completed pavement deviates by more than twice the specified tolerances, remove and replace wearing surface.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Transverse Slope Maximum Deviation: ¼ inch in 12 feet from the rate of slope shown.
4. Finished Grade:
 - a. Perform a field differential level survey on a maximum 50-foot grid and along all grade breaks.
 - b. Maximum Deviation: 0.02 foot from the grade shown.

G. Seal Coat:

1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where the asphalt concrete was placed by hand, patched surfaces, and other areas as directed by the Engineer.
2. Preparation:
 - a. Maintain surfaces that are to be sealed free of holes, dry, and clean of dust and loose material.
 - b. Seal in dry weather and when the temperature is above 35 degrees F.
3. Application:
 - a. Fill cracks over 1/16 inch in width with an asphalt-sand slurry or approved crack sealer prior to sealing.
 - b. When sealing patched surfaces and joints with existing pavements, extend minimum 6 inches beyond edges of patches.

3.05 PAVEMENT OVERLAY

A. Preparation:

1. Remove fatty asphalt, grease drippings, dust, and other deleterious matter.
2. Surface Depressions: Fill with asphalt concrete mix, and thoroughly compact.
3. Damaged Areas: Remove broken or deteriorated asphalt concrete and patch as specified in Article Patching.
4. Portland Cement Concrete Joints: Remove joint filler to minimum 1/2 inch below surface.

B. Application:

1. Tack Coat: As specified in this Section.
2. Place and compact asphalt concrete as specified in Article Pavement Application.
3. Place first layer to include widening of pavement and leveling of irregularities in the surface of the existing pavement.
4. When leveling irregular surfaces and raising low areas, the actual compacted thickness of any one lift shall not exceed 2 inches.
5. The actual compacted thickness of intermittent areas of 120 square yards or less may exceed 2 inches, but not 4 inches.
6. Final wearing layer shall be of uniform thickness, and meet grade and cross-section as shown.

3.06 PATCHING

A. Preparation:

ASPHALT CONCRETE PAVEMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.
2. Prepare patch subgrade as specified in Section 02319, Subgrade Preparation.

B. Application:

1. Patch Thickness: 3 inches or thickness of adjacent asphalt concrete, whichever is greater.
2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.

C. Compaction:

1. Roll patches with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Use hand tampers where rolling is impractical.
2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least 1/2 the roller width. Progress toward center of patch overlapping each preceding track by at least 1/2 the width of roller.
3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:

1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.
2. Tolerance: Surface smoothness shall not deviate more than plus 1/4 inch or minus 0 when a straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.07 FIELD QUALITY CONTROL

A. General: Provide services of an approved certified independent testing laboratory to conduct tests.

B. Field Density Tests:

1. Perform tests from cores or sawed samples.
2. Measure with properly operating and calibrated nuclear density gauge.
3. Maximum Density: In accordance with ASTM D2041, using a sample of mix taken prior to compaction from the same location as the density test sample.

C. Testing Frequency:

1. Quality Control Tests:
 - a. Asphalt Content, Aggregate Gradation: Once per every 500 tons of mix or once every 4 hours, whichever is greater.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. Mix Design Properties, Measured Maximum (Rice's) Specific Gravity: Once every 1,000 tons or once every 8 hours, whichever is greater.
2. Density Tests: Once every 500 tons of mix or once every 4 hours, whichever is greater.

END OF SECTION

ASPHALT CONCRETE PAVEMENT

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02958
STRUCTURAL MANHOLE LINING****PART 1 GENERAL****1.1 DESCRIPTION**

- A. Section includes Work required for the various type of manhole linings identified in the repair schedule contained in the plans. The materials and methods included in this section are designed to eliminate infiltration through manhole walls and enhance structural integrity of severely deteriorated manholes. Materials of linings are spray applied polymeric (epoxy and polyurethane) resins.

1.2 SUBMITTALS

- 2.1 Contractor shall submit manufacturer's technical literature on material and description of installation method including, but not limited to:

1. Requirements for application, such as temperature and humidity.
2. Requirements for worker safety, such as ventilation and safe handling procedures.
3. Maximum storage life
4. Mixing and proportioning requirements for specific application
5. Pot life
6. Curing time
7. Physical properties
8. Test results on resistance to abrasive chemicals.

1.3 QUALITY ASSURANCE

- A. Product application shall be performed only by workmen trained and experienced with specified and trained in confined space entry.
1. Certification: Applicators for spray-applied coating installation shall be certified by the manufacturer.
 2. Contractor Experience: Minimum of five (5) years of experience with similar applications of the materials specified.

PART 2 PRODUCTS**2.1 SPRAY APPLIED RESINS**

- A. The spray-applied coating shall be resistant to hydrogen sulfide gas, sulfuric acid, and other chemical typically found in sanitary sewers.
- B. The spray-applied coating shall also be resistant to damage due to impact and abrasion.
- C. The spray-applied coating shall be either Raven coating system, or IET coating system or approved equal. The liner shall conform to the minimum physical requirements listed below.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Compressive strength, ASTM D695	10,500 psi
Flexural modulus (initial), ASTM D790	73,500
Flexural strength, ASTM D790	12,000 psi
Bond strength, ASTM D4541	Must exceed substrate tensile strength
Tensile strength, ASTM D638	7,000 psi
Chemical Resistance (ASTM D543) – Exposure to sodium hypochlorite (10 percent) and sulfuric acid (15 percent) for 168 hours	No degradation in physical or mechanical properties.

PART 3 EXECUTION**3.1. GENERAL**

- A. All pipes in service shall be plugged or bypassed in accordance with Section 02750 before any work is started on the structure. No debris shall be flushed down the line.
- B. Only personnel who are aptly trained in confined space entry shall be permitted to enter the structure. All OSHA requirements for confined space entry equipment and permitting shall be complied with. The Contractor shall obtain a confined space entry permit prior to beginning any work.
- C. Liners shall completely cover cone, wall, chimney, bench and channel, as applicable, as a one piece solid liner. No voids, leaks, channels or gaps may remain behind the installed liner.

3.2. PREINSTALLATION/SURFACE PREPARATION

- A. High Pressure grout: High pressure grout shall be injected from the interior of the manhole surfaces into cracks and voids in order to stop leaks. The use of hydraulic cement will not be allowed.
 - 1. Suitable equipment shall be utilized for pumping the grout from above ground through a hose and injecting the grout under pressure to fill voids beyond the manhole structures. The equipment shall have a means of measuring the amount of grout used in gallons.
 - 2. Grout shall be used in accordance with the manufacturer's recommendations for the specific application.
 - 3. The following are acceptable grout products: Avanti AV-202 Multigrout or pre-approved equal.
- B. Patching cement: After all loose and deteriorated material has been removed from the interior surfaces of the manhole and after all leaks have been grouted, patching cement shall be applied to fill in any irregularities to achieve an acceptable smooth surface.
 - 1. Patching cement shall be compatible with the liner material as specified in item 2.1

STRUCTURAL MANHOLE LINING

CA 06-8224
02958-2
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Evaluation of Atmosphere: Prior to entering structures, an evaluation of the atmosphere shall be conducted to determine the presence of toxic, flammable vapors or possible lack of oxygen. The evaluation shall be in accordance with local, state or federal safety regulations.
- D. Clean manhole ring and cover free of rust and debris so the lid will properly seat when reinstalling the lid. Use power brushing such as wire wheel on a grinder/needle gun as most types of debris cannot be removed by hand wire brushing.
- E. Surfaces to be lined shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide strong bond between the lining and substrate.
- F. High pressure water jetting (NACE Standard No. 5/SSPC-SP12) abrasive (sand) blasting, and mechanical wire-brushing shall be the methods to remove previous coatings, laitance, contaminated, disintegrated or chalky material. Detergent water cleaning and hot water blasting may be necessary to remove oil and grease.
- G. Use of acid for cleaning purposes, no matter how dilute, will not be allowed. Loose or protruding brick, mortar and concrete shall be removed by using a mason's hammer and chisel. Fill any large voids with quick setting cement patch mix recommended by the manufacturer of liner products. The surface to be repaired must be clean and free of any loose materials.
- H. Application of liner shall not be made unless the ambient Temperature inside the structure is 50 degrees F or higher and all manhole surfaces are sufficiently dry to ensure proper adhesion of the liner to the existing manhole walls.
- I. After the patched areas have cured sufficiently, prepare manhole wall surfaces in accordance with the manhole liner manufacturer's recommendations.
- J. All resurfaced or repaired surfaces shall be inspected for cleanliness and suitability to receive spray-applied liner. Additional surface preparation may be necessary prior to application.
- K. Apply manhole liner in accordance with manufacturer's recommendation regarding temperature and installation procedures and in accordance with City of Fort Lauderdale specifications. The liner shall be applied to the invert and walls of the manhole from the bench up to the bottom of the casting.
- L. Only manufacturer-certified personnel shall be permitted to install spray-applied liner.
- M. Spray equipment shall be specifically designed to accurately ration and apply the coating products and shall be in good working order.
- N. Prepared surfaces shall be lined by spray application to a minimum wet film thickness of 200 mils.

STRUCTURAL MANHOLE LINING

CITY OF FORT LAUDERDALE
02958-3
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- O. During application, a wet film thickness gauge meeting ASTM D4414 shall be used. All necessary measurements shall be taken and attested to by the CONTRACTOR. Written reports signed by the CONTRACTOR shall be given to the OWNER and PROJECT MANAGER.
- P. Allow the final application to cure for the amount of time recommended by the manufacturer before being subjected to sewage flow, or installation of spray-applied liner (where indicated).

3.3. QUALITY CONTROL

- A. Inspect lining system for holidays, crack, and pinholes using the spark-test method and equipment in accordance with NACE RPO 188. Especially check the lining over brick, block, and very rough surfaces.
- B. Repair voids and holidays per the manufacturer's instructions.

3.4. SAFETY

- A. The CONTRACTOR shall carry out operations under this section in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving entry into a confined space. It shall be the CONTRACTOR's responsibility to comply with OSHA Standard and Regulations pertaining to all aspects of the work.

PART 4 WARRENTY

Provide a ten (10) year unlimited warranty on all workmanship and products. The work covered by the warranty shall include surface preparation, grouting, line application, as well as other work performed under this section. The warranty shall be effective beginning on the date of final acceptance by City of Fort Lauderdale, and shall guarantee that the manhole will be protected from leaks and from failure due to corrosion from exposure to hydrogen sulfide and other corrosive chemicals normally encountered in raw sewage.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02958-01
IET COATING SYSTEM****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. This specification provides details for furnishing and installing the Integrated Environmental Technologies (IET) coating system where shown on the drawings for protection of concrete structures against hydrogen sulfide corrosion. Coating materials shall be as manufactured by Integrated Environmental Technologies or pre-approved equal. Installation shall be performed by workers experienced in the application of the coating to be used.

PART 2 PRODUCTS**2.1 IET COATING SYSTEM**

- A. The IET Coating System shall be as distributed by Integrated Environment Technologies, Santa Barbara, VA or pre-approved equal.
- B. Polymorphic Resin shall be a 100% solid, two-component, highly modified polyester resin system, exhibiting no adhesion-interfering shrinkage upon curing. Resin shall cure rapidly within fifteen minutes to one hour without the use of heat or cooling at surface temperatures ranging from -30 degrees Fahrenheit to over +150 degrees. Excellent resistance to a broad range of corrosive chemical, including sulfuric acid created by hydrogen sulfide gas as well as other chemicals typically found in sanitary sewer, and impact and abrasion attack shall be provided.

PART 3 EXECUTION**3.1. IET COATING**

- A. All pipes in service shall be plugged or bypassed before any work is started on the structure. No debris is to be flushed down the line.
- B. Anyone entering the structure must conform to all OSHA requirements for "Confined Space Entry" equipment and permitting.
- C. Surface preparation shall meet the requirements of IET Systems Data Sheets on Concrete Preparation and interior surfaces of manhole shall be sound, porous, dry, and free of dust, dirt, oil, grease, and other contaminants prior to application of lining.
- D. Interior surface of structure must be pressure washed at 5,000 psi and must be abrasive-blasted with black beauty steel slag to remove all loose patching, old coatings and any contamination in the concrete. No silica sand shall be used.
- a. "New" structures shall be abrasive-blasted to remove all oils and patch mud and to open pin holes and expose aggregate.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. "Rehab" structures shall be abrasive-blasted to remove all loose patching, old coatings, and any contamination that penetrated the concrete. The finished interior of the structure shall be gray. The exposed invert/floor shall also be coated. Where there is severe deterioration of the mortar, place new concrete to match the original interior dimensions after abrasive-blasting and removal of all loose material and by-products of corrosion. Restore invert/floor to the original elevation.
 - c. Vacuum to remove all abrasives and debris.
- E. Repair all leaks by injecting grout using Avanti Multi-grout AV-202 or pre-approved equivalent. Hydraulic cement shall not be used to stop and water leaks.
- F. Clean and remove dust material with pressure washing for maximum adhesion. Blow dry concrete at 250 cfm with 12- psi.
- G. Apply IET Systems Coating by the use of the IET Systems Spray Unit and IET Systems Spincaster. Apply IET coating at least three different intervals-prime coat, intermediate coat, and finish coat, per IET Systems manufacturer instructions and specifications. The total thickness of the IET coating shall be at least 125 mils.
- H. Inspect lining system for holidays, crack and pinholes. Take particular care to check lining over brick, block, heavy spalled surfaces, and other very rough surfaces and locate holes in the lining caused by voids in bricks, block, concrete and structure joints. Fill voids and holidays in accordance with the lining system manufacturer's instructions.
- I. Provide a ten (10) year unlimited warranty on all workmanship and products. The work includes the surface preparation and application of the IET coating system, shall protect the structure for at least ten (10) years from all leaks, and from failure due to corrosion form exposure to corrosive gases such as hydrogen sulfide.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 02958-02
RAVEN COATING SYSTEM****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. This specification covers all labor, materials, equipment and services necessary to complete the manhole rehabilitation work using the Raven Coating System as herein specified.

1.2 SUBMITTALS**A. Product Data**

1. Technical data sheet on each product used.
2. Material Safety Data Sheet (MSDS) for each product used.
3. Copies of independent testing performed on the coating product indicating the product meets the requirements as specified herein.
4. Technical data sheet and project specific data for repair materials to be topcoated with the coating product(s) including application, cure time and surface preparation procedures.

B. Contractor Data:

1. Current documentation from coating product manufacturer certifying contractor's training and equipment complies with the Quality assurance requirements specified herein.
2. Five (5) recent references of Contractor indicating successful application of coating product(s) of the same material type as specified herein, applied by spray application within the municipal wastewater environment.

1.3 QUALITY ASSURANCE

- A. Coating product(s) shall be capable of being installed and curing properly within a manhole environment. Coating product(s) shall be resistant to all forms of chemical or bacteriological attack found in municipal sanitary sewer systems; capable of adhering to the manhole structure substrates.
- B. Repair product(s) shall be fully compatible with coating product(s) including ability to bond effectively forming a composite system.
- C. Contractor shall be certified by the coating product manufacturer for the handling, mixing, application and inspection of the coating product(s) to be used as specified herein.
- D. Inspectors shall be trained in the use of testing or inspection instrumentation and knowledgeable of the proper use, preparation and installation of coating product(s) to be used as specified herein.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. Contractor shall initiate and enforce quality control procedures consistent with the coating product(s) manufacturer recommendations and applicable NACE or SSPC standards as referenced herein.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Materials are to be kept dry, protected from weather and stored under cover.
- B. Protective coating materials are to be stored between 50 F and 90 F. Do not store near flame, heat or strong oxidants.
- C. Protective coating materials are to be handled according to their material safety data sheets.

1.5 SITE CONDITIONS

- A. Contractor shall conform with all local, state and federal regulations including those set forth by OSHA, RCRA, and the EPA and any other applicable authorities.
- B. Confined space entry, flow diversion and/or bypass plans shall be presented by Contractor as necessary to perform the specified work.

1.6 SPECIAL WARRANTY

- A. Contractor shall warrant all work against defects in materials and workmanship for a period of ten (10) years, unless otherwise noted, from the date of final acceptance of the project. Contractor shall, within a reasonable time after receipt of written notice thereof, repair defects in material or workmanship which may develop during said ten (10) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and with cost to Owner.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

- A. Standard Portland cement or new concrete (not quick setting high strength cement) must be cured a minimum of 28 days prior to application of the coating product(s).
- B. Remove existing coatings prior to application of the coating product(s) which may affect the performance and adhesion of the coating product(s).
- C. Thoroughly clean and prepare existing products to effect a seal with the coating product(s)

2.2 REPAIR AND RESURFACING PRODUCTS

- A. Repair products shall be used to fill voids, bugholes, and/or smooth transitions between components prior to the installation of the coating product(s). Repair

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

materials must be compatible with the specified coating product(s) and shall be used and applied in accordance with the manufacturer's recommendations.

- B. Resurfacing products shall be used to fill large voids, lost mortar in masonry structures, smooth deteriorated surfaces and rebuild severely deteriorated structures.
- C. The following products may be accepted and approved as compatible repair and resurfacing products for use within the specifications:
 - 1. 100% solids, solvent-free epoxy grout specifically formulated for epoxy topcoating compatibility.
 - 2. Factory blended, repair setting, high early strength, fiber reinforced, non-shrink repair mortar that can be trowelled or pneumatically spray applied may be approved is specifically formulated to be suitable for topcoating with the specified coating product(s).

2.3 COATING PRODUCTS

- A. Manufacturer: Raven Lining Systems, Broken Arrow, Oklahoma 800-324-2810, 918-615-0020 or FAX 918-615-0140
- B. Product: Raven 405 – 100% solids, solvent-free ultra high-build epoxy system exhibiting the following characteristics:
 - 1. Product type: amine cured epoxy
 - 2. VOC Content (ASTM D2584): 0%
 - 3. Tensile Strength, psi (ASTM D695): 18,000 (minimum)
 - 4. Tensile Strength, psi (ASTM D638): 7,500 (minimum)
 - 5. Flexural Modulus, psi (ASTM D790): 600,000 (minimum)
 - 6. Adhesion to Concrete, mode of failure (ASTM D4541): Substrate (concrete) failure.
 - 7. Chemical Resistance (ASTM D5463/G20) all types of service for:
 - a. Municipal sanitary sewer environment
 - b. Sulfuric acid, 25%
 - c. Hydrogen Sulfide Gas, All concentrations
 - d. Sodium hydroxide, 5%

2.4 COATING APPLICATION EQUIPMENT

- A. Manufacturer approved heated plural component spray equipment.
- B. Hard to reach areas, primer application and touch-up may be performed using hand tools.

PART 3 EXECUTION

3.1. EXAMINATION

RAVEN COATING SYSTEM

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. Appropriate actions shall be taken by contractor to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety during work.
- B. All structures to be coated shall be readily accessible to Contractor.
- C. New Portland cement concrete structures shall have endured a minimum of 28 days since manufacture prior to commencing coating installation
- D. Any active flows shall be dammed, plugged or diverted as required to ensure all liquids are maintained below or away from the surfaces to be coated.
- E. Temperature of the surface to be coated should be maintained between 40 F and 120 F
- F. Specified surfaces should be shielded to avoid exposure of direct sunlight or other intense heat source. Where varying surface temperature do exist, coating installation should be scheduled when the temperature is falling versus rising.
- G. Prior to commencing surface preparation, Contractor shall inspect all surfaces specified to receive the coating and notify Owner, in writing, of any noticeable disparity in the site, structure or surfaces which may interfere with the work, use of materials or procedures as specified herein.

3.2. SURFACE PREPARATION

- A. Oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts or other contaminants which may affect the performance and adhesion of the coating to the substrate shall be removed.
- B. Concrete and/or mortar damaged by corrosion, chemical attack or other means of degradation shall be removed so that only sound substrate remains.
- C. Choice of surface preparation method(s) should be based upon the condition of the structure and concrete or masonry surface, potential contaminants present, access to perform work, and required cleanliness and profile of the prepared surface to receive the coating product(s).
- D. Surface preparation method, or combination of methods, that may be used include high pressure water cleaning, high pressure water jetting, abrasive blasting, shotblasting, grinding, scarifying, detergent water cleaning, hot water blasting and others described in NACE no. 6/SSPC SP-13. Whichever method(s) are used, they shall be performed in a manner that provides uniform, sound clean neutralized surfaces suitable for topcoating with the coating product(s)
- E. Infiltration shall be stopped by using a material which is compatible with the repair products and is suitable for topcoating with the coating product(s).
- F. Termination points of the coating product(s) shall be made at the bottom of the manhole frame, a minimum of 1" interfacing with each pipe penetration. The manhole frame and casting shall not be coated.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- G. All manhole surfaces shall be sufficiently dry to ensure proper adhesion of liner to the existing manhole walls.

3.3. APPLICATION OF REPAIR AND RESURFACING PRODUCTS

- A. Areas where rebar has been exposed and is corroded shall be first prepared in accordance with Section 3.2. The exposed rebar shall then be abrasive blasted and coated with coating product specified.
- B. Repair products shall be used to fill voids, bugholes, and other surface defects which may affect the performance or adhesion of the coating product(s).
- C. Resurfacing products shall be used to repair, smooth or rebuild surfaces with rough profiles to provide a concrete or masonry substrate suitable for the coating product(s) to be applied. These products shall be installed to minimum thickness as recommended within manufacturers published guidelines.
- D. Repair and resurfacing products shall be handled, mixed, installed and cured in accordance with manufacturer guidelines.
- E. All repaired or resurfaces shall be inspected for cleanliness and suitability to receive the coating product(s). Additional surface preparation may be required prior to coating application.

3.4. APPLICATION OF COATING PRODUCT(S)

- A. Application procedures shall conform to the recommendations of the coating product(s) manufacturer, including environmental controls, product handling, mixing, application equipment and methods.
- B. Spray equipment shall be specifically designed to accurately ratio and apply the coating product(s) and shall be in proper working order.
- C. Contractors qualified in accordance with section 1.4 of these specifications shall perform all aspects of coating product(s) installation.
- D. Prepared surfaces shall be coated by spray application of the coating product(s) described herein to a minimum wet film thickness of 175 mils.
- E. Subsequent topcoating or additional coats of the coating product(s) shall occur within the products recoat window. Additional surface preparation procedures will be required if the recoat window is exceeded.
- F. Coating product(s) shall interface with adjoining construction materials throughout the manhole structure to effectively seal and protect concrete or masonry substrates from infiltration and attack by corrosive elements. Procedures and materials necessary to effect this interface shall be as recommended by the coating product(s) manufacturer.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- G. Termination points of the coating product(s) shall be made at the bottom of the manhole frame, and a minimum of 1" interfacing with each pipe penetration. The manhole frame and casting shall not be coated.
- H. Manhole inverts shall be coated.
- I. Sewage flow shall be stopped, bypassed or diverted for application of the coating product(s) to the invert and interface with pipe material.

3.5. TESTING AND INSPECTION

- A. During application a wet film thickness gauge, meeting ASTM D4414-Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used. Measurements shall be taken, documented and attested to by Contractor for submission to Owner.
- B. After the coating product(s) have set in accordance with manufacturer instructions, all surfaces shall be inspected for holidays with high voltage holiday detection equipment. Reference NACE RPO 188-89 for performing holiday detection. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, addition coating can be hand applied to the repair area. All touch-up/repair procedures shall follow the coating manufacturer's recommendations. Documentation on areas tested, results and repairs made shall be provided to Owner by Contractor.
- C. Visual inspection shall be made by the project Engineer and/or Inspector. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Contractor.
- D. The municipal sewer system may be returned to full operational service as soon as the final inspection has taken place.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 03200
CONCRETE REINFORCEMENT****PART 1 - GENERAL****1.01 THE REQUIREMENT**

- A. The CONTRACTOR shall furnish, fabricate and place all concrete reinforcing steel, welded wire fabric, couplers, and concrete inserts for use in reinforced concrete and deformed reinforcing bars for masonry walls and shall perform all appurtenant work, including all the wires, clips, supports, chairs, spacers, and other accessories, all in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals
- B. Concrete Pavement, Curbs and Sidewalk
- C. Concrete Formwork
- D. Joints in Concrete
- E. Cast-in-Place Concrete
- F. Precast Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of other requirements of these specifications, all Work specified herein shall conform to or exceed the requirements of the Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section. All referenced specifications, codes, and standards refer to the most current issue available at the time of bid.

- 1. Codes and Standards

The Building Code, as referenced herein, is the Florida Building Code.

- 2. Commercial Standards

ACI 315R Details and Detailing of Concrete Reinforcement.

CRSI Concrete Reinforcing Steel Institute Manual of Standard Practice

ACI 305R Hot Weather Concreting

ACI 318R Building Code Requirements for Reinforced Concrete.

CONCRETE REINFORCEMENT

03200-1

CAM 16-1224

EXHIBIT 4

Page 362 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

ACI 350 Code Requirements for Environmental Engineering Concrete Structures

WRI Manual of Standard Practice for Welded Wire Fabric.

AWS DI.4 Structural Welding Code - Reinforcing Steel.

ASTM A 185-88 Specification for Welded Steel Wire Fabric for Concrete Reinforcement.

ASTM A 615-89 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

1.04 SUBMITTALS

- A. The CONTRACTOR shall submit detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66) for all reinforcing steel. These drawings shall be made to such a scale as to clearly show joint locations, openings, the arrangement, spacing and splicing of the bars. Where opening sizes are dependent on equipment selection the CONTRACTOR shall indicate all necessary dimensions to define steel lengths and placing details.
- B. Details of the concrete reinforcing steel and concrete inserts shall be submitted by the CONTRACTOR at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed. Said details of reinforcing steel for fabrication and erection shall conform to ACI 315 and the requirements specified and shown. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. The shop Drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.
- C. Where mechanical couplers are shown on the Drawings to be used to splice reinforcing steel, the CONTRACTOR shall submit manufacturer's literature which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop Drawings which show the location of each coupler with details of how they are to be installed in the formwork.
- D. If reinforcing steel is spliced by welding at any location, the CONTRACTOR shall submit mill test reports which shall contain the information necessary for the determination of the carbon equivalent as specified in AWS DI.4. The CONTRACTOR shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding, merely a statement that AWS procedures will be followed is not acceptable. Welding of rebar shall be done only where shown on the Drawings or allowed in writing by the ENGINEER.

PART 2 - PRODUCTS

2.01 REINFORCEMENT

CONCRETE REINFORCEMENT

03200-2

CAM 16-1224

EXHIBIT 4

Page 363 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, and shall be manufactured in the United States.
 2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details shown on the Drawings; provided, that welded wire fabric with longitudinal wire of W9.5 size wire shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only. All welded wire fabric reinforcement shall be galvanized.

2.02 ACCESSORY MATERIALS

- A. Bolsters, chairs, spacers and other devices for supporting and fastening reinforcing in place shall be galvanized wire type complying with CRSI recommendations on grade with gray plastic tipped legs.
- B. Metal bar supports for reinforcing steel for wastewater structures shall be Class 2, Type B stainless steel protected bar supports (CRSI).
- C. Tie Wire: Galvanized 16 gauge annealed type.
- D. Concrete blocks (dobies), used to support and position reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Concrete blocks shall only be used for slabs on grade.

2.03 FABRICATION

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than 1-1/2 inch for No. 3 bars, 2-inch for No. 4 bars, and 2-1/2 inch for No. 5 bars. Bends for other bars shall be made around a pin having a diameter not less than 6 times the minimum thickness, except for bars larger than 1 inch, in which case the bends shall be made around a pin of 8 bar diameters. Bars shall be bent cold.
- B. The CONTRACTOR shall fabricate reinforcing bars for structures in accordance with bending diagrams, placing lists, and placing Drawings. Said Drawings, diagrams, and lists shall be prepared by the CONTRACTOR as specified under Section entitled "Submittals," herein.
- C. Fabricating Tolerances: Bars used for concrete reinforcing shall meet the following requirements for fabricating tolerances:
1. Sheared length: + 1 inch
 2. Depth of truss bars: + 0, - 1/2 inch

CONCRETE REINFORCEMENT

03200-3

CAM 16-1224

EXHIBIT 4

Page 364 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Stirrups and ties: + 1/2 inch
 4. All other bends: + 1 inch
- D. Welded splice shall be provided where required on the drawings. All welded splices of reinforcing steel shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcing bars which are connected.
- E. All materials required to perform the welded splices to the requirements of AWS D1.4 shall be provided.

2.04 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Contract Drawings to be drilled in grouted, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix and shall be injected with a static mixing nozzle following manufacturer's instructions. The embedment depth of the bar as minimum shall match the dimension shown on the Drawings or increased as required to provide a minimum allowable bond strength that is equal to 125 percent of the yield strength of the bar. The adhesive system shall be "Sikadur Injection Gel" as manufactured by Sika Corporation, "Epcon System" as manufactured by ITW Ramset / Redhead, "HIT C-100 System" as manufactured by Hilti, Inc., or equal. ENGINEER's approval is required for use of this system in locations other than those shown on the Contract Drawings.

2.05 MINIMUM REINFORCEMENT

- A. At locations where reinforcing steel is not indicated on the drawings, minimum reinforcement shall be provided.
- B. Minimum reinforcement shall be 0.2 percent of the cross sectional area along each face of the concrete member.

PART 3 -- EXECUTION

3.01 FABRICATION

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than 1-1/2 inch for No. 3 bars, 2 inch for No. 4 bars, and 2-1/2 inch for No. 5 bars. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness, except for bars larger than 1 inch, in which case the bends shall be made around a pin of 8 bar diameters. Bars shall be bent cold.
- B. The CONTRACTOR shall fabricate reinforcing bars for structures in the accordance with bending diagrams, placing lists and placing Drawings. Said Drawings, diagrams and lists shall be prepared by the contractor as specified under Section entitled "Submittals,".

CONCRETE REINFORCEMENT

03200-4

CAM 16-1224

EXHIBIT 4

Page 365 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.
- D. No fabrication shall commence until approval of Shop Drawings has been obtained and all bars shall be shop fabricated unless approved by the ENGINEER to be bent in the field. Bars shall not be straightened or rebent in a manner that will injure the material. Heating of any bars will not be permitted.
- E. Welded Wire Fabric shall be furnished and installed as flatmats.

3.02 TEMPERATURE REINFORCEMENT

- A. Unless otherwise shown on the Drawings or in the absence of the steel being shown, the minimum cross sectional area of horizontal and vertical reinforcing steel in walls shall be 0.0033 times the gross concrete area and the minimum cross sectional area of steel perpendicular to the principal steel in slabs shall be 0.0020 times the gross concrete area. Temperature steel shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

3.03 PLACEMENT

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- C. Bars additional to those shown on the Drawings which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.
- D. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318 except where in conflict with the requirements of the Building Code.
- E. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be as acceptable to the ENGINEER.

CONCRETE REINFORCEMENT

03200-5

CAM 16-1224

EXHIBIT 4

Page 366 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified in 2.02B herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane shown on the Drawings.
- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.
- H. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than one inch.
- I. Where reinforcement in beams or girders is placed in two or more layers, the clear distance between layers shall be not less than one inch.
- J. In columns, the clear distance between longitudinal bars shall be not less than 1-1/2 times the bar diameter, nor less than 1-1/2 times the maximum size of the coarse aggregate, nor less than 1-1/2 inches.
- K. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.
- L. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the ENGINEER.
- M. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 350, Section 12.15 and ACI 318, Section 12.15.1 for a class B splice.
- N. Laps of welded wire fabric shall be in accordance with the ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- O. Reinforcing shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used. All bars shall be bent cold, unless otherwise permitted by the ENGINEER. No bars partially embedded in concrete shall be field-bent except as shown on the Drawings or specifically permitted by the ENGINEER.

3.04 CLEANING AND PROTECTION

- A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is

CONCRETE REINFORCEMENT

03200-6

CAM 16-1224

EXHIBIT 4

Page 367 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

delay in depositing concrete, reinforcing shall be reinspected and, if necessary
recleaned.

END OF SECTION

CONCRETE REINFORCEMENT

03200-7

CAM 16-1224

EXHIBIT 4

Page 368 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL**1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this Section:

1. American Concrete Institute (ACI):
 - a. 117, Standard Specification for Tolerances for Concrete Construction and Materials.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 - c. 301, Standard Specification for Structural Concrete.
 - d. 302.1R, Guide For Concrete Floor and Slab Construction.
 - e. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - f. 304.2R, Placing Concrete by Pumping Methods.
 - g. 305R, Hot Weather Concreting.
 - h. 306.1, Standard Specification for Cold Weather Concreting.
 - i. 309R, Guide for Consolidation of Concrete.
 - j. 318/318R, Building Code Requirements for Structural Concrete.
 - k. SP-15, Standard Specification for Structural Concrete.
2. ASTM International (ASTM):
 - a. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C33, Standard Specification for Concrete Aggregates.
 - c. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - e. C94, Standard Specification for Ready-Mixed Concrete.
 - f. C143, Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - g. C150, Standard Specification for Portland Cement.
 - h. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C192, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
 - j. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - k. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - l. C311, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
 - m. C452, Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate.

CAST-IN-PLACE CONCRETE

CA 11880-24
03300-1
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- n. C494, Standard Specification for Chemical Admixtures for Concrete.
 - o. C595, Standard Specification for Blended Hydraulic Cements.
 - p. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - q. C1012, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - r. C1018, Standard Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading).
 - s. C1116, Standard Specification for Fiber-Reinforced Concrete and Shotcrete
 - t. C1218 Standard Test Method for Water-Soluble Chloride in Mortar and Concrete
 - u. C1240, Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout.
 - v. D2000, Standard Classification System for Rubber Products in Automotive Applications.
 - w. D4580, Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding.
 - x. E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
3. National Bureau of Standards: Handbook No. 44, Specifications, Tolerances, and Other Technical Requirements for Commercial Weighing and Measuring Devices.

1.02 DEFINITIONS

- A. Defective Areas: Surface defects that include honeycomb, rock pockets, indentations greater than 3/16 inch, cracks 0.005 inch wide and larger as well as any crack that leaks for liquid containment basins and belowgrade habitable spaces; cracks 0.010 inch wide and larger in nonfluid holding structures spalls, chips, air bubbles greater than 3/4 inch in diameter, pinholes, bug holes, embedded debris, lift lines, sand lines, bleed lines, leakage from form joints, fins and other projections, form popouts, texture irregularities, and stains and other color variations that cannot be removed by cleaning.
- B. Exposed Concrete: Concrete surfaces that can be seen inside or outside of structures regardless whether concrete is above water, dry at all times, or can be seen when structure is drained.
- C. Hydraulic Structures: Liquid containment basins.
- D. New Concrete: Less than 60 days old.
- E. Slurry Concrete: Mixture of sand, 3/8-inch minus aggregate, cement, and water for wall construction joints.

CAST-IN-PLACE CONCRETE

CA 1160122
03500-2
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Product Data: Admixtures, bonding agent, bond breaker, and patching materials.
 - b. Design Data: Concrete mix designs signed by qualified mix designer.
 - c. Placement Drawings:
 - 1) Concrete, identifying location of each type of construction joint.
 - 2) Tremie concrete.
 - d. Gradation for coarse and fine aggregates, and combined together. List gradings, percent passing through each sieve size.
 - e. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F.
 - f. Concrete repair methods and materials.

B. Informational Submittals:

1. Statements of Qualification:
 - a. Contractor's resident superintendent for concrete installation.
 - b. Mix designer.
 - c. Batch plant.
2. Test Reports:
 - a. Admixtures, test reports showing chemical ingredients and percentage of chloride in each admixture and fly ash.
 - b. Source test analysis report for fly ash, including percentage of chloride content.
 - c. Statement identifying aggregates reactivity. Determine water soluble chloride in each component of aggregates in accordance with ASTM C1218.
 - d. For each trial concrete mix design and signed by a qualified mix designer.
 - e. Cylinder compressive test results for laboratory concrete mixes.
3. Concrete Delivery Tickets:
 - a. For each batch of concrete before unloading at Site.
 - b. Record of drum revolution counter, type, brand, test certification, Amount of fly ash if used in accordance with ASTM C94, Section 16.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Mix Designer: Licensed professional engineer registered in the State of Florida.
2. Batch Plant: Currently certified by the National Ready Mixed Concrete Association.

CAST-IN-PLACE CONCRETE

CA 11880-24
03500-23
EXHIBIT 4

Page 371 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Preinstallation Conference:

1. Required Meeting Attendees:
 - a. Contractor, including pumping, placing and finishing, and curing subcontractors.
 - b. Ready-mix producer.
 - c. Admixture representative.
 - d. Testing and sampling personnel.
 - e. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.
3. Agenda shall include:
 - a. Admixture types, dosage, performance, and redosing at Site.
 - b. Mix designs, test of mixes, and Submittals.
 - c. Placement methods, techniques, equipment, consolidation, and form pressures.
 - d. Slump and placement time to maintain slump.
 - e. Finish, curing, and water retention.
 - f. Protection procedures for weather conditions.
 - g. Other specified requirements requiring coordination.
4. Conference minutes as specified in Section 01200, Project Meetings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: Furnish from one source.

1. Portland Cement Type I or Type II:
 - a. Meet ASTM C150.
 - b. Alkalies: Maximum 0.60 percent.
 - c. Tricalcium Aluminate Content of Type I Cement: Maximum 12 percent.
 - d. Nonhydraulic Abovegrade Structures: Type I or Type II cement.
 - e. Hydraulic and Belowgrade Structures and Sewers: Type II cement or combination of Type I mixed with fly ash.
 - f. Combine fly ash with cement at batch plant or during production of cement in accordance with ASTM C595, Type IP cement.

B. Aggregates: Furnish from one source.

1. Natural Aggregates:
 - a. Free from deleterious coatings and substances in accordance with ASTM C33, except as modified herein.
 - b. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
2. Nonpotentially Reactive: In accordance with ASTM C33, Appendix XI, Paragraph X1.1.
3. Aggregate Soundness: Test for fine and coarse aggregates in accordance with ASTM C33 and ASTM C88 using sodium sulfate solution.

CAST-IN-PLACE CONCRETE

CA 1160124
0350124
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Fine Aggregates:
 - a. Clean, sharp, natural sand.
 - b. ASTM C33.
 - c. Materials Passing 200 Sieve: 4 percent maximum.
 - d. Limit deleterious substances in accordance with ASTM C33, Table 1 with material finer than 200 sieve limited to 3 percent, coal and lignite limited to 0.5 percent.
 5. Coarse Aggregate:
 - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
 - b. Materials Passing 200 Sieve: 0.5 percent maximum.
 - c. Limit deleterious substances in accordance with ASTM C33, Table 3 for exposed concrete.
- C. Admixtures: Furnish from one manufacturer.
1. Characteristics: Compatible with each other and free of chlorides or other corrosive chemicals.
 2. Air-Entraining Admixture:
 - a. ASTM C260, nontoxic after 30 days and contains no chlorides.
 - b. Concrete with air-entrainment admixture added shall maintain air percentage as batched, within plus or minus 2 percent for time required for placement into structure.
 3. Water-Reducing Admixture: ASTM C494, Type A or Type D.
 - a. Manufacturers and Products:
 - 1) Master Builders, Inc., Cleveland, OH; Pozzolith or Polyheed.
 - 2) W. R. Grace & Co., Cambridge, MA; WRDA with HYCOL.
 - 3) Euclid Chemical Co., Cleveland, OH; Eucon WR-91.
 4. High Range Water Reducing Admixture (Superplasticizer):
 - a. ASTM C494.
 - b. Hold slump of 5 inches or greater for time required for placement.
 - c. Furnish type as recommended by manufacturer for allowed temperature ranges.
 - d. Type F or G.
 - e. Manufacturers and Products:
 - 1) Master Builders, Inc., Cleveland, OH; Rheobuild or Polyheed at dosage greater than 10 ounces per 100 pounds of cement.
 - 2) W. R. Grace & Co., Cambridge, MA; Daracem 100.
 - 3) Euclid Chemical Co., Cleveland, OH; Eucon 537.
 5. Pozzolan (Fly Ash): Class C or Class F fly ash in accordance with ASTM C618, Table 1 and 2, except as modified herein:
 - a. Shall not be produced from process that has utilized hazardous or potentially hazardous materials.
 - b. Loss on Ignition: Maximum 3 percent.
 - c. Water Requirement: Maximum 100 percent of control.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- d. $\frac{CaO(\%) - 5}{FE_2O_3(\%)}$:Maximum 1.5
- e. ASTM C618, Table 3, Reactivity with Cement Alkalies, apply when aggregate or portions of aggregate is reactive as specified under Paragraph Nonpotentially Reactive.
- f. ASTM C618, Table 3, Uniformity Requirements, apply when loss on ignition of fly ash furnished exceeds 3 percent.
- 6. Fly Ash: Maximum 25 percent, minimum 15 percent of total weight of fly ash plus cement.
- 7. For fly ash not meeting requirements of chemical ratio listed above, furnish the following:
 - a. Test fly ash in accordance with ASTM C1012.
 - b. Furnish test data confirming fly ash in combination with cement used meets strength requirements, is compatible with air-entraining agents and other additives, and provides increased sulfate resistance equivalent to or better than Type II cement.
 - c. Conduct tests using proposed fly ash and cement samples together with control samples using Type II cement without fly ash.

D. Water: Clean and potable containing less than 500 ppm of chlorides.

2.02 CONCRETE MIX DESIGN

- A. Design: Select and proportion ingredients using trial batches; sample, cure and test concrete mix through approved independent testing laboratory in accordance with ACI 211.1.
 - 1. Concrete Compressive Strength, F'c:
 - a. 4,000 psi at 28 days, unless otherwise shown, except 3,000 psi at 28 days for secondary concrete elements such as curbs, sidewalks, and pipe/conduit encasements.
 - b. Design lab-cured trial mix cylinders.
 - c. Use additional cement or cement plus fly ash above minimum specified if required to meet average compressive strength, F'cr.
 - d. Use F'cr as basis for selection of concrete proportions as set forth in ACI 301.
 - e. F'cr: Equal to F'c plus 1,200 when data are not available to establish standard deviation.
 - 2. Concrete Fill:
 - a. Design for 2,500 psi at 28 days using 1-inch aggregate, 4-inch maximum slump and 0.46 maximum water-cement ratio.
 - b. Use water-reducing admixture.
- B. Proportions:
 - 1. Design mix to meet aesthetic and structural concrete requirements.
 - 2. In accordance with ACI 211.1, unless specified otherwise.

CAST-IN-PLACE CONCRETE

CA 11880-24
03500-26
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Unless specifically stated otherwise, water-cement ratio (or water-cement plus fly ash ratio) shall control amount of total water added to concrete as follows:

Water-Cement Ratio		
Coarse Aggregate Size	Maximum Ratio w/ Superplasticizer	Maximum W/C Ratio w/o Superplasticizer
1-1/2"	0.40	0.44
1"	0.40	0.44
3/4"	0.40	0.44

4. Minimum Cement Content (or Combined Cement Plus Fly Ash Content When Fly Ash is Used):
- 517 pounds per cubic yard for concrete with 1-1/2-inch maximum size aggregate.
 - 540 pounds per cubic yard for 1-inch maximum size aggregate.
 - 564 pounds per cubic yard for 3/4-inch maximum size aggregate.
 - Increase cement content or combined cement plus fly ash content, as required to meet strength requirements and water-cement ratio.

C. Admixtures:

- Air Content: 4 to 6 percent when tested in accordance with ASTM C231; 3 percent maximum for interior slabs where heavy-duty concrete floor finish is required.
- Fly Ash: Maximum 25 percent, minimum 15 percent of total weight of fly ash plus cement.
- Water Reducers: Use in all concrete.
- High Range Water Reducers (Superplasticizers): Use at Contractor's option. Control slump and workability to at least 4-1/2-inch slump at discharge into forms by adjusting high range water reducer at batch plant.

D. Slump Range at Site:

- 4-1/2 inches minimum, 8 inches maximum for concrete with a high range water reducing admixture.
- 3 inches minimum and 5 inches maximum for concrete without high range water reducing admixture.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

E. Combined Aggregate Gradation:

1. Structures: Select one of the gradations shown in the following table.
2. Combined Gradation Limits: Limits shown are for coarse aggregates and fine aggregates mixed together (combined).

Sieve Sizes	Combined Gradation		
	Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
2"	- 100	-	-
1-1/2"	95 - 100	- 100	-
1"	65 - 85	90 - 100	- 100
3/4"	55 - 75	70 - 90	92 - 100
1/2"	-		68 - 86
3/8"	40 - 55	45 - 65	57 - 74
No. 4	30 - 45	31 - 47	38 - 57
No. 8	23 - 38	23 - 40	28 - 46
No. 16	16 - 30	17 - 35	20 - 36
No. 30	10 - 20	10 - 23	14 - 25
No. 50	4 - 10	2 - 10	5 - 14
No. 100	0 - 3	0 - 3	0 - 5
No. 200	0 - 2	0 - 2	0 - 2

F. Tremie Concrete:

1. Minimum cement content of 658 pounds per cubic yard.
2. Use high range water reducing admixture (superplasticizers) admixture in accordance with ASTM C494, Type F or Type G.
3. Fine Aggregate Range: 40 to 50 percent of total aggregates by weight.
4. Use natural round gravel if available in Project area.
5. Proportion mix for design strength and slump range of 6 to 9 inches with maximum water-cement ratio.
6. Use anti-washout admixture in accordance with manufacturer's recommendations.

2.03 CONCRETE MIXING

A. General: In accordance with ACI 304R.

B. Concrete Mix Temperatures: As shown below for various stages of mixing and placing:

CONCRETE TEMPERATURES

CAST-IN-PLACE CONCRETE

 CA 1160124
 0350048
 EXHIBIT 4

Page 376 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Ambient Air Temp.	Concrete Member Size, Minimum Dimension			
	<12"	12"-36"	36"-72"	>72"
Minimum concrete temperature as mixed for indicated air temperature:				
Above 30 deg. F	60 deg. F	55 deg. F	50 deg. F	45 deg. F
0 to 30 deg. F	65 deg. F	60 deg. F	55 deg. F	50 deg. F
Below 0 deg. F	70 deg. F	65 deg. F	60 deg. F	55 deg. F
Maximum allowable gradual temperature drop in first 24 hours after curing period and after end of protection:				
–	50 deg. F	40 deg. F	30 deg. F	20 deg. F

C. Truck Mixers:

1. Equip with electrically actuated counters to readily verify number of revolutions of drum or blades.
2. Counter:
 - a. Resettable, recording type, mounted in driver's cab.
 - b. Actuated at time of starting mixers at mixing speeds.
3. Truck mixer operation shall furnish concrete batch as discharged that is homogeneous with respect to consistency, mix, and grading.
4. If slump tests taken at approximately 1/4 and 3/4 points of load during discharge give slumps differing by more than 2 inches when specified, slump is more than 4 inches, discontinue use of truck mixer unless causing condition is corrected and satisfactory performance is verified by additional slump tests.
5. Before attempting to reuse unit, check mechanical details of mixer, such as water measuring, and discharge apparatus, condition of blades, speed of rotation, general mechanical condition of unit, admixture dispensing equipment, and clearance of drum.
6. Do not use nonagitating or combination truck and trailer equipment for transporting ready-mixed concrete.
7. Concrete Volume in Truck:
 - a. Limit to 63 percent of total volume capacity in accordance with ASTM C94 when truck mixed.
 - b. Limit to 80 percent of total volume capacity when central mixed.
8. Mix each batch of concrete in truck mixer for minimum 70 revolutions of drum or blades at rate of rotation designated by equipment manufacturer.
9. Perform additional mixing, if required, at speed designated by equipment manufacturer as agitating speed.
10. Place materials, including mixing water, in mixer drum before actuating revolution counter for determining number of mixing revolutions.

D. Aggregates: Thoroughly and uniformly wash before use.

E. Admixtures:

CAST-IN-PLACE CONCRETE

CA 11880-29
03500-29
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Air-Entraining Admixture: Add at plant through manufacturer-approved dispensing equipment.
2. Water Reducers: Add prior to addition of high range water reducing admixture (superplasticizers).
3. High range water reducing admixture (superplasticizers) and Air-Entraining Admixtures:
 - a. Add at concrete plant only through equipment furnished or approved by admixture manufacturer.
 - b. Accomplish variations in slump, working time, and air content for flowable mixes by increasing or reducing high range water reducing admixture (superplasticizers) dose or air-entraining admixture dose at ready-mix plant only.
 - c. Equipment shall provide for easy and quick visual verification of admixture amount used for each dose.
 - d. Add discharge amount to each load of concrete into separate dispensing container, verify amount is correct, and add to concrete.
 - e. Additional dosage of high range water reducing admixture (superplasticizers) may be added in field using manufacturer-approved dispensing when unexpected delays cause too great of slump loss.

2.04 SOURCE QUALITY CONTROL

- A. Cement: Test for total chloride content.
- B. Fly Ash: Test in accordance with ASTM C311.
- C. Batch Plant Inspection: Engineer shall have access to and have right to inspect batch plants, cement mills, and supply facilities of suppliers, manufacturers, and Subcontractors, providing products included in these Specifications.
 1. Weighing Scales: Tested and certified within tolerances set forth in the National Bureau of Standards Handbook No. 44.
 2. Batch Plant Equipment: Either semiautomatic or fully automatic in accordance with ASTM C94.

PART 3 EXECUTION**3.01 PLACING CONCRETE**

- A. Preparation: Meet requirements and recommendations of ACI 304R and ACI 301, except as modified herein.
- B. Inspection: Notify Engineer at least 1 full working day in advance before starting to place concrete.
- C. Discharge Time:

CAST-IN-PLACE CONCRETE

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. As determined by set time, do not exceed 1-1/2 hours after adding cement to water unless special approved time delay admixtures are used. Coordinate time delay admixture information with manufacturer and Engineer prior to placing concrete.
2. Adjust slump or air content at Site by adding admixtures for particular load when approved by Engineer. Then, adjust plant dosage for remainder of placement. Additional dosage at Site shall be through approved dispenser supplied by admixture manufacturer.
3. Maintain required slump throughout time of concrete placement and consolidation. Discontinue use of high range water reducing admixture (superplasticizers) and provide new mix design if it fails to maintain slump between 4 to 8 inches and produce good consolidation for the length of time required. Redesign mix adjusting set control admixtures to maintain setting time in range required.

D. Placement into Formwork:

1. Before depositing concrete, remove debris from space to be occupied by concrete.
2. Prior to placement of concrete, dampen fill under slabs on ground, dampen sand where vapor retarder is specified, and dampen wood forms.
3. Reinforcement: Secure in position before placing concrete.
4. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 1.5 feet deep, except for slabs which shall be placed full depth. Place and consolidate successive layers prior to initial set of first layer to prevent cold joints.
5. Use placement devices, for example, chutes, pouring spouts, and pumps.
6. Vertical Free Fall Drop to Final Placement: 5 feet in forms 8 inches or less wide and 8 feet in forms wider than 8 inches, except as specified.
 - a. For placements where drops are greater than specified, use placement device such that free fall below placement device conforms to required value.
 - b. Limit free fall to prevent segregation caused by aggregates hitting reinforcing steel.
7. Do not use aluminum conveying devices.
8. Provide sufficient illumination in the interior of forms so concrete deposition is visible, permitting confirmation of consolidation quality.
9. Joints in Footings and Slabs:
 - a. Ensure space beneath plastic water stop completely fills with concrete.
 - b. During concrete placement, make visual inspection of entire water stop area.
 - c. Limit concrete placement to elevation of water stop in first pass, vibrate concrete under water stop, lift water stop to confirm full consolidation without voids, place remaining concrete to full height of slab.
 - d. Apply procedure to full length of water stops.

CAST-IN-PLACE CONCRETE

00500-121
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

10. If reinforcement is in direct sunlight or is more than 20 degrees F higher in temperature than concrete temperature before placement, wet reinforcement with water fog spray before placing concrete to cool reinforcement.
 11. Trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.
- E. Conveyor Belts and Chutes:
1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system for concrete to pass without becoming segregated.
 2. Do not use chutes longer than 50 feet.
 3. Minimum Slopes of Chutes: Angled to allow concrete to readily flow without segregation.
 4. Conveyor Belts:
 - a. Approved by Engineer.
 - b. Wipe clean with device that does not allow mortar to adhere to belt.
 - c. Cover conveyor belts and chutes.
- F. Retempering: Not permitted for concrete where cement has partially hydrated.
- G. Pumping of Concrete:
1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to assure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
 2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
 3. Replace pumping equipment and hoses (conduits) that are not functioning properly.
- H. Maximum Size of Concrete Placements:
1. Limit size of each placement to allow for strength gain and volume change due to shrinkage
 2. Locate expansion, control, contraction, and construction joints where shown. When expansion or control joints are not shown, provide construction joints at maximum spacing of 40 feet. When expansion or control joint spacing exceeds 60 feet, provide intermediate construction joints at maximum spacing of 40 feet. Uniformly space construction joints. Vertical construction joint shall not be greater than 20 feet from wall corners or intersections
 3. Consider beams, girders, brackets, column capitals, and haunches as part of floor or roof system and place monolithically with floor or roof system.
 4. Should placement sequence result in cold joint located below finished water surface, install water stop in joint.

CAST-IN-PLACE CONCRETE

09/16/22
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

I. Minimum Time Between Adjacent Placements:

1. Construction Joints: 14 days (7 days wet cure and 7 days dry cure).
2. Control Joints: 6 days.
3. Expansion Joints/Contraction Joints: 1 day.
4. At least 2 hours shall elapse after depositing concrete in long columns and walls thicker than 8 inches before depositing concrete in beams, girders, or slabs supported thereon.
5. For columns and walls 10 feet in height or less, wait at least 45 minutes prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.

J. Removal of Water: Unless tremie method for placing concrete is specified, remove water from space to be occupied by concrete.

K. Consolidation and Visual Observation:

1. Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude as required to consolidate concrete in section being placed.
2. Provide at least one standby vibrator in operable condition at placement Site prior to placing concrete.
3. Consolidation Equipment and Methods: ACI 309R.
4. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete.
5. Vibration consolidation shall not exceed distance of 3 feet from point of placement.
6. Vibrate concrete in vicinity of joints to obtain impervious concrete.

L. Hot Weather:

1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 305R.
2. Placement frequency shall be such that lift lines will not be visible in exposed concrete finishes.
3. Maintain concrete temperature below 90 degrees F at time of placement, or furnish test data or provide other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking due to heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
4. Provide for windbreaks, shading, fog spraying, sprinkling, ice, wet cover, or other means as necessary to maintain concrete at or below specified temperature.
5. Prevent differential temperature between reinforcing steel and concrete.
6. Evaporation Retardant: As specified in Section 03370, Concrete Curing.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.02 PLACING TREMIE CONCRETE SEALS

- A. Place concrete when water level inside area to be filled with concrete is equal to groundwater elevation outside.
- B. Maintain relation of water levels until concrete design strength is obtained.

3.03 CONCRETE BONDING

- A. Horizontal Construction Joints in Reinforced Concrete Walls:
 - 1. Thoroughly clean and saturate surface of joint with water.
 - 2. Limit slurry concrete placement to 2-inch maximum thickness, 1-inch minimum thickness.
 - 3. Use positive measuring device such as bucket or other device that will contain only enough slurry concrete for depositing in visually measurable area of wall to ensure that portion of form receives appropriate amount of slurry concrete to satisfy placement thickness requirements.
 - 4. Do not deposit slurry concrete from pump hoses or large concrete buckets, unless specified placement thickness can be maintained and verified through inspection windows close to joint.
 - 5. Limit concrete placed immediately on top of slurry concrete to 12 inches thick. Thoroughly vibrate to mix concrete and slurry concrete together.
- B. To Existing Concrete:
 - 1. Thoroughly clean and mechanically roughen existing concrete surfaces to roughness profile of 1/4 inch.
 - 2. Saturate surface with water for 24 hours prior to placing new concrete.

3.04 CONSTRUCTION JOINTS

- A. As specified in Section 03251, Concrete Joints.

3.05 REPAIRING CONCRETE

- A. General:
 - 1. Inject cracks that leak with crack repair epoxy.
 - 2. Obtain quantities of repair material and manufacturer's detailed instructions for use to provide repair with finish to match adjacent surface or apply sufficient repair material adjacent to repair to blend finish appearance.
 - 3. Repair of concrete shall provide structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.
- B. Tie Holes:
 - 1. Fill with nonshrink grout as specified in Section 03600, Grout.

CAST-IN-PLACE CONCRETE

00360124
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Match color of adjacent concrete and demonstrate on mockup panels first.
3. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.

C. Alternate Form Ties; Through-Bolts:

1. Mechanically roughen entire interior surface of through hole. Epoxy coat roughened surface and drive elastic vinyl plug to half depth. Dry pack entire hole from both sides of plug with nonshrink grout, as specified in Section 03600, Grout. Use only enough water to dry pack grout. Dry pack while epoxy is still tacky. If epoxy has dried, remove epoxy by mechanical means and reapply new epoxy.
2. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.

D. Exposed Metal Objects:

1. Metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, shall be removed by chipping back concrete to depth of 1 inch and then cutting or removing metal object.
2. Repair area of chipped-out concrete per requirements of Section 03720, Vertical And Overhead Concrete Repair Systems.

E. Blockouts at Pipes or Other Penetrations:

1. Install per details shown on Drawings or submit proposed blockouts for review.
2. Use nonshrink, nonmetallic grout.

3.06 CONCRETE WALL FINISHES

A. Type W-1 (Ordinary Wall Finish):

1. Patch tie holes.
2. Knock off projections.
3. Patch defective areas.

B. Type W-2 (Smooth Wall Finish):

1. Patch tie holes.
2. Grind off projections, fins, and rough spots.
3. Patch defective areas and repair rough spots resulting from form release agent failure or other reasons to provide smooth uniform appearance.

C. Type W-4 (Finish for Cementitious Coatings):

1. Patch tie holes.
2. Grind off projections, fins, and rough spots.
3. Patch and repair defective areas as specified for Type W-2.

CAST-IN-PLACE CONCRETE

09300-45
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

D. Type W-5 (Finish for Painting):

1. Patch tie holes.
2. Grind off projections, fins, and rough spots.
3. Patch and repair defective areas as specified for Type W-2.
4. Leave surface ready for painting as specified in Section 09900, Painting and Protective Coatings.

E. Type W-7 (Smooth Rubbed Wall Finish):

1. Only water curing will be permitted on walls being rubbed.
2. Perform rubbing while green concrete can be physically worked and smoothed without adding other materials, if structurally possible, the day following placement. Finish no later than 3 days after placement has been completed.
3. Remove forms at such a rate that all finishing, form tie filling, fin removal, and patching can be completed on same day forms are removed while curing wall.
4. After pointings have set sufficiently to permit working on surface, thoroughly saturate entire surface with water for period of 3 hours and rub until uniform surface is obtained.
5. Rub either by hand with carborundum stone of medium-coarse grade or abrasive of equal quality, or mechanically operated carborundum stone.
6. Mechanically operated carborundum stones shall be approved by Engineer before concrete finishing.
7. No cement grout, other than cement paste drawn from the concrete itself by the rubbing process shall be used.
8. Finish paste formed by rubbing by either brushing or floating as follows:
 - a. Brushing:
 - 1) Carefully strike with clean brush.
 - 2) Brush in long direction of surface being finished.
 - b. Floating:
 - 1) Spread uniformly over surface and allow to reset.
 - 2) Finish by floating with canvas, carpet face, or cork float, or rub down with dry burlap.
9. Continue water curing of wall during finishing operation in areas not being rubbed.
10. Move water curing onto rubbed areas as soon as water will not erode rubbed surface.

F. Type W-8 (Rubbed Wall Finish):

1. Meet requirements for Type W-7, except allow paste obtained from rubbing to set at least 24 hours.
2. After thoroughly saturating with water, coat surface with mixture of 85 percent cement and 15 percent lime with sufficient water to give creamy consistency. Demonstrate on sample panel prior to production finishing.
3. Rub this mixture into surface with coarse carborundum stone and brush with damp brush.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Brush in long direction of surface being finished.
5. Latex bonding admixture may be used. Consult with Euclid Chemical Co., Cleveland, OH or Master Builders Co., Cleveland, OH.

G. Type W-9 (Grout Cleaned Finish):

1. Meet requirements for Type W-7, except that finish must be accomplished within 7 days of placement.
2. Grout: Mixed with 1 part Portland cement and 1-1/2 parts fine sand and bonding agent to produce grout with consistency of thick paint. White Portland cement shall be substituted for part of gray Portland cement in order to produce color matching color of surrounding concrete, as determined by trial patch.
3. Wet surface of concrete sufficiently to prevent absorption of water from grout and apply grout uniformly with brushes or spray gun.
4. Immediately after applying grout, scrub surface vigorously with cork float or stone to coat surface and fill air bubbles and holes.
5. While grout is still plastic, remove excess grout by working surface with rubber float, burlap, or other means. After surface whitens from drying (about 30 minutes at 70 degrees F), rub vigorously with clean burlap. Continue to water cure wall until curing period of 7 days is complete.
6. Latex bonding admixture may be used.

H. Type W-10 (Fractured Fin Finish):

1. Form exterior surface of walls with approved form liner.
2. Use stainless steel form ties and place at valleys.
3. Patch form tie holes.
4. Achieve final texture by light sandblast and then breaking off tips of ridge with light bushhammering, or other approved process.
5. Same person starting bushhammering shall complete process for any given structure and match approved mockup panel.

I. Type W-11 (Abrasive Blast - Sandblast Finish):

1. Intent of this procedure is to remove surface skin to depth no more than 1/16 inch, and expose only fine aggregate and air holes near surface, thus producing uniform texture.
2. Perform sandblasting on building or on concrete surfaces in same area of view at same time and obtain uniformity of appearance.
3. Same person shall accomplish sandblasting on one structure and on concrete in same area.
4. Perform sandblasting to match approved mockup panel.
5. Abrasive: Use clean silica sand, free of foreign materials, and supplied in sealed sacks.
6. Blast surface with 100 psi air pressure at rate of 2 to 3 square feet per minute with nozzle held approximately 2 feet from surface and perpendicular thereto.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.07 CONCRETE SLAB FINISHES

A. General:

1. Finish slab concrete per the requirements of ACI 302.1R.
2. Use manual screeds, vibrating screeds, or roller compacting screeds to place concrete level and smooth.
3. Do not use "jitterbugs" or other special tools designed for purpose of forcing coarse aggregate away from surface and allowing layer of mortar, which will be weak and cause surface cracks or delamination, to accumulate.
4. Do not dust surfaces with dry materials.
5. Use evaporation retardant.
6. Round off edges of slabs with steel edging tool, except where cove finish is shown. Steel edging tool radius shall be 1/4 inch for slabs subject to wheeled traffic.

B. Type S-1 (Steel Troweled Finish):

1. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation. Use evaporation retardant.
2. While concrete is still green, but sufficiently hardened to bear a person's weight without deep imprint, wood float to true, even plane with no coarse aggregate visible.
3. Use sufficient pressure on wood floats to bring moisture to surface.
4. After surface moisture has disappeared, hand trowel concrete to produce smooth, impervious surface, free from trowel marks.
5. Burnish surface with an additional troweling. Final troweling shall produce ringing sound from trowel.
6. Do not use dry cement or additional water during troweling, nor will excessive troweling be permitted.
7. Power Finishing:
 - a. Approved power machine may be used in lieu of hand finishing in accordance with directions of machine manufacturer.
 - b. Do not use power machine when concrete has not attained necessary set to allow finishing without introducing high and low spots in slab.
 - c. Do first steel troweling for slab S-1 finish by hand.

C. Type S-2 (Wood Float Finish):

1. Finish slab to receive fill and mortar setting bed by screeding with straightedges to bring surface to required finish plane.
2. Wood float finish to compact and seal surface.
3. Remove laitance and leave surface clean.
4. Coordinate with other finish procedures.

D. Type S-4 (Exposed Aggregate Finish):

1. Embed single layer of selected aggregates at surface of concrete slab immediately after it has been placed, screeded, and smoothed.

CAST-IN-PLACE CONCRETE

01/16/2018
09:50:48
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Embed aggregates by tamping with wood float, darby, or rolling device.
3. Accomplish exposure of selected aggregates by removing surface matrix by washing with water and brushing with stiff plastic bristled brush as soon as concrete has set sufficiently to support weight of a person.
4. Exposure: No greater than 1/3 the average diameter of aggregate, nor less than 1/4.
5. Next day acid wash until there is no noticeable cement film on aggregate exposed.
6. Apply clear sealer per manufacturer's recommendations.

E. Type S-5 (Broomed Finish):

1. Finish as specified for Type S-1 floor finish, except omit final troweling and finish surface by drawing fine-hair broom lightly across surface.
2. Broom in same direction and parallel to expansion joints, or, in the case of inclined slabs, perpendicular to slope, except for round roof slab, broom surface in radial direction.

F. Type S-6 (Sidewalk Finish):

1. Slope walks down 1/4 inch per foot away from structures, unless otherwise shown.
2. Strike off surface by means of strike board and float with wood or cork float to true plane, then flat steel trowel before brooming.
3. Broom surface at right angles to direction of traffic or as shown.
4. Lay out sidewalk surfaces in blocks, as shown or as directed by Engineer, with grooving tool.

G. Concrete Curbs:

1. Float top surface of curb smooth, and finish all discontinuous edges with steel edger.
2. After concrete has taken its initial set, remove front form and give exposed vertical surface an ordinary wall finish, Type W-1.

3.08 CONCRETE SLAB TOLERANCES

A. Slab Tolerances:

1. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
2. Slab Finish Tolerances and Slope Tolerances: Crowns on floor surface not too high as to prevent 10-foot straightedge from resting on end blocks, nor low spots that allow block of twice the tolerance in thickness to pass under supported 10-foot straightedge.
3. Slab Type S-A: Steel gauge block 5/16 inch thick.
4. Slab Type S-B: Steel gauge block 1/8 inch thick.
5. Slab Type S-A and S-B: Finish Slab Elevation: Slope slabs to floor drain and gutter, and shall adequately drain regardless of tolerances.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

6. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.
- B. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.

3.09 BEAM AND COLUMN FINISHES

- A. General: Inject cracks with crack repair epoxy. Patch and repair defective areas.
- B. Match Wall Type:
 1. Repair rock pockets.
 2. Fill air voids.

3.10 BACKFILL AGAINST WALLS

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.
- B. Place backfill simultaneously on both sides of wall, where required, to prevent differential pressures.

3.11 FIELD QUALITY CONTROL

- A. General:
 1. Provide adequate facilities for safe storage and proper curing of concrete test cylinders onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
 2. Provide concrete for testing of slump, air content, and for making cylinders from the point of discharge into forms. When concrete is pumped, Samples used shall be taken from discharge end of pump hose.
 3. Evaluation will be in accordance with ACI 301 and Specifications.
 4. Specimens shall be made, cured, and tested in accordance with ASTM C31 and ASTM C39.
 5. Frequency of testing may be changed at discretion of Engineer.
 6. Pumped Concrete: Take concrete samples for slump (ASTM C143) and test cylinders (ASTM C31 and C39) and shrinkage specimens (ASTM C157) at placement (discharge) end of line.
 7. Reject concrete represented by cylinders failing to meet strength and air content specified.

CAST-IN-PLACE CONCRETE

09300120
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Tolerances:

1. Walls: Measure and inspect walls for compliance with tolerances specified in Section 03100, Concrete Formwork.
2. Slab Finish Tolerances and Slope Tolerances:
 - a. Floor flatness measurements shall be made day after floor is finished and before shoring is removed to eliminate effects of shrinkage, curing, and deflection.
 - b. Support 10-foot long straightedge at each end with steel gauge blocks of thicknesses equal to specified tolerance.
 - c. Compliance with designated limits in four of five consecutive measurements is satisfactory, unless defective conditions are observed.

C. Water Leakage Tests:

1. Purpose: Determine integrity and watertightness of finished exterior and interior water holding concrete surfaces.
2. Potable Water Supply Reservoirs: Clean and sterilize prior to conducting test as specified in Section 02519, Disinfection of Water Systems.
3. Water-Holding Structures:
 - a. Perform leakage tests after concrete structure is complete and capable of resisting hydrostatic pressure of water test. Concrete shall have achieved its full design strength.
 - b. Perform leakage test before backfill, brick facing, grout topping slab, coatings, or other work that will cover concrete surfaces has begun.
 - c. Install temporary bulkheads, cofferdams, and pipe blind flanges, and close valves. Inspect each to see that it provides complete seal.
 - d. Fill with water to test level shown, or maximum liquid level if no test level is given. Maintain this level for 72 hours prior to start of test to allow water absorption, structural deflection, and temperature to stabilize.
 - e. Measure evaporation and precipitation by floating a partially filled, transparent, calibrated, open top container.
 - f. Measure water surface at two points 180 degrees apart when possible where attachments, such as ladders exist, at 24-hour intervals. Using sharp pointed hook gauge and fixed metal measure capable of reading to 1/100 of an inch. Continue test for period of time sufficient to produce at least 1/2-inch drop in water surface based on assumption that leakage would occur at maximum allowable rate specified or for 72 hours, whichever is lesser time.
4. Acceptance Criteria:
 - a. Volume loss shall not exceed 0.075 percent of contained liquid volume in 24-hour period, correcting for evaporation, precipitation, and settlement.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. No damp spots or seepage visible on exposed surfaces. Damp spot is defined as sufficient moisture to be transferred to dry hand upon touching.
- 5. Repairs When Test Fails: Dewater structure; fill leaking cracks with crack repair epoxy as specified in Section 03740, Concrete Repair Crack Injection. Patch areas of damp spots previously recorded, and repeat water leakage test in its entirety until the structure successfully passes the test.

3.12 MANUFACTURER'S SERVICES

- A. Provide the following representative at Site in accordance with Section 01640, Manufacturers' Services, for installation assistance, inspection, and certification of proper installation for concrete ingredients, mix design, mixing, and placement.
 - 1. Batch Plant Representative:
 - a. Observe how concrete mixes are performing.
 - b. Be present during first placement of each type of concrete mix.
 - c. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout Project.
 - d. Establish control limits on concrete mix designs.
 - 2. Admixture Manufacturer's Representative:
 - a. Demonstrate special features, product performance, product mixing, testing, and placement or installation for each type of admixture.
 - b. Observe how concrete mixes are performing.
 - c. Be present during first placement of each type of concrete mix.
 - d. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout Project, including instructions for redosing.
 - e. Provide equipment for control of concrete redosing for air entrainment or high range water reducing admixture (superplasticizers) at Site to maintain proper slump and air content if so needed.
 - 3. Bonding Agent Manufacturer's Representative: Demonstrate product performance, product mixing, and placement.

3.13 PROTECTION OF INSTALLED WORK

- A. After curing as specified in Section 03370, Concrete Curing, and after applying final floor finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep floor clean and protect it from material and damage due to other construction work.
- B. Repair defective areas and areas damaged by construction.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 03301
REINFORCED CONCRETE****PART 1 GENERAL****1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 301, Specifications for Structural Concrete for Buildings.
 - b. 305R, Hot Weather Concreting.
 - c. 306R, Cold Weather Concreting.
 - d. 318/318R, Building Code Requirements for Reinforced Concrete.
 - e. 347, Formwork for Concrete.
 2. ASTM International (ASTM):
 - a. A497, Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - b. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - c. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - d. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - e. C94, Standard Specification for Ready-Mixed Concrete.
 - f. C150, Standard Specification for Portland Cement.
 - g. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - h. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - i. C494, Standard Specification for Chemical Admixtures for Concrete.
 - j. C618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
 - k. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 3. Concrete Reinforcing Steel Institute (CRSI):
 - a. Manual of Standard Practice.
 - b. Recommended Practice for Placing Reinforcing Bars.

1.02 SUBMITTALS

- A. Action Submittals:
1. Reinforcing steel in accordance with CRSI Manual of Standard Practice.
 2. Curing compound data.

REINFORCED CONCRETE

CA 03301-1224
03301-1
EXHIBIT 4
Page 391 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Complete data on the concrete mix, including aggregate gradations and admixtures, in accordance with ASTM C94.

B. Informational Submittals:

1. Manufacturer's application instructions for curing compound.
2. Ready-mix delivery tickets for each truck in accordance with ASTM C94.

1.03 QUALITY ASSURANCE

- A. Formwork: Unless otherwise specified, follow the recommendations of ACI 347.
- B. Concrete and Reinforcement: Unless otherwise specified, meet the requirements of ACI 301 and ACI 318/318R.
- C. Hot Weather Concreting: Conform to ACI 305R.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not use curing compound where solvents in the curing compounds are prohibited by state or federal air quality laws. Use only water curing methods.

PART 2 PRODUCTS

2.01 CONCRETE

- A. Ready-mixed meeting ASTM C94, Option A.
- B. Portland Cement: ASTM C150, Type I or II.
- C. Admixtures:
 1. Air-Entraining: ASTM C260.
 2. Water-Reducing: ASTM C494, Type A or Type D.
 3. Superplasticizers: ASTM C494, Type F or Type G.
 4. Fly Ash: ASTM C618, Class C or Class F.
 5. Color Pigments: Inert mineral or metaloxide pigments, either natural or synthetic; resistant to lime and other alkalies.
- D. Mix Design:
 1. Minimum Allowable 28-day Compressive Field Strength: 3,000 psi when cured and tested in accordance with ASTM C31 and ASTM C39.
 2. Water-Cement Ratio: 0.48, maximum.
 3. Cement Content: 540 pounds per cubic yard, minimum.
 4. Coarse Aggregate Size: **3/4** inch(es) and smaller.
 5. Slump Range: 3 inches to 5 inches.
 6. Air Entrainment: Between 3 and 6 percent by volume. Use 4 percent minimum for concrete placed under requirements of cold weather concreting.

REINFORCED CONCRETE

CA 11880-1224
03301-2
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

7. Water Reducers: Use in concrete without plasticizers.
 8. Superplasticizers: Use for structures.
- E. Mixing: Minimum 70 and maximum 270 revolutions of mixing drum. Nonagitator equipment is not allowed.

2.02 REINFORCING STEEL

- A. Deformed Bars: ASTM A615, Grade 60.
- B. Welded Wire Fabric: ASTM A497.

2.03 ANCILLARY MATERIALS

- A. Expansion Joint Filler: ASTM D994, 1/2-inch thick, or as shown.
- B. Nonshrink Grout:
1. Color: To match concrete.
 2. Manufacturers and Products:
 - a. Master Builder Co., Cleveland, OH; Master Flow 928.
 - b. Euclid Chemical Co., Cleveland, OH; Hi-flow Grout.
- C. Clear Floor Hardener (Surface-Applied): Colorless, aqueous solution of zinc and magnesium fluosilicate with a minimum 2 pounds of crystals per gallon.
1. Manufacturers:
 - a. Master Builders, Co., Cleveland, OH.
 - b. Tamms Industries, Inc., Kirkland, IL.
 - c. Sonneborn, Minneapolis, MN.

PART 3 EXECUTION

3.01 FORMWORK

- A. Form Materials:
1. Use hard plastic finished plywood for exposed areas, and new shiplap or plywood for unexposed areas.
 2. Earth cuts may be used for forming footings.
- B. Form Ties:
1. Fixed conical or spherical type inserts that remain in contact with forming material and allow for dry packing of form tie holes.
 2. Ties shall withstand pressures and limit deflection of forms to acceptable limits.
 3. Wire ties are not acceptable.
- C. Construction:
1. In accordance with ACI 347.

REINFORCED CONCRETE

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Make joints tight to prevent escape of mortar and to avoid formation of fins.
3. Brace as required to prevent distortion during concrete placement.
4. On exposed surfaces locate form ties in uniform pattern or as shown.
5. Construct so ties remain embedded in the wall with no metal within 1 inch of concrete surface when forms, inserts, and tie ends are removed.

D. Form Removal:

1. Remove after concrete has attained 28-day strength, or approval is obtained in writing from Engineer.
2. Remove forms with care to prevent scarring and damaging the surface.
3. Prior to form removal, provide thermal protection for concrete being placed under the requirements of cold weather concreting.

3.02 PLACING REINFORCING STEEL

A. Unless otherwise specified, place reinforcing steel in accordance with CRSI Recommended Practice for Placing Reinforcing Bars.

B. Splices and Laps:

1. Top Bars: Horizontal bars placed such that 12 inches of fresh concrete is cast below in single placement.
2. Horizontal wall bars are considered top bars.
3. Lap top bars 42 diameters or minimum 24 inches.
4. Lap all other bars 30 diameters or minimum 18 inches.
5. Tie splices with 18-gauge annealed wire as specified in CRSI Standard.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Prior to placing concrete, remove water from excavation and debris and foreign material from forms. Check reinforcing steel for proper placement and correct discrepancies.

C. Before depositing new concrete on old concrete, clean surface using sandblast or bushhammer or other mechanical means to obtain a 1/4-inch rough profile, and pour a cement-sand grout to minimum depth of 1/2 inch over surface. Proportion 1 part cement to 2.5 parts sand by weight.

D. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 2 feet deep. Place within 1-1/2 hours after adding cement to mix.

E. Eight feet maximum vertical drop to final placement, when not guided with chutes or other devices to prevent segregation due to impact with reinforcing.

REINFORCED CONCRETE

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.04 COMPACTION

A. Vibrate concrete as follows:

1. Apply approved vibrator at points spaced not farther apart than vibrator's effective radius.
2. Apply close enough to forms to vibrate surface effectively but not damage form surfaces.
3. Vibrate until concrete becomes uniformly plastic.
4. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

3.05 CONSTRUCTION JOINTS

A. Locate as shown or as approved.

B. Maximum Spacing between Construction Joints: 40 feet.

3.06 FINISHING

A. Floor Slabs and Tops of Walls:

1. Screed surfaces to true level planes.
2. After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.
3. Do not absorb wet spots with neat cement.

B. Unexposed Slab Surfaces: Screed to true surface, bull float with wood float, and wood trowel to seal surface.

C. Tolerances: Floors shall not vary from level or true plane more than 1/4 inch in 10 feet when measured with a straightedge.

D. Exterior Slabs and Sidewalks:

1. Bull float with wood float, wood trowel, and lightly trowel with steel trowel.
2. Finish with broom to obtain nonskid surface.
3. Finish exposed edges with steel edging tool.
4. Mark walks transversely at 5-foot intervals, or in pattern shown on Drawings, with jointing tool.

3.07 FINISHING AND PATCHING FORMED SURFACES

A. Cut out honeycombed and defective areas.

B. Cut edges perpendicular to surface at least 1 inch deep. Do not feather edges. Soak area with water for 24 hours.

C. Patch with shotcrete or low pressure mortar as specified in Section 03720, Vertical and Overhead Concrete Surface Repair Systems.

REINFORCED CONCRETE

CA 031601224
0330123
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Finish surfaces to match adjacent concrete.
- E. Keep patches damp for minimum 7 days or spray with curing compound to minimize shrinking.
- F. Fill form tie holes with nonshrink grout.

3.08 PROTECTION AND CURING

- A. Protect fresh concrete from direct rays of sunlight, drying winds, and wash by rain.
- B. Keep concrete slabs continuously wet for a 7-day period. Intermittent wetting is not acceptable.
- C. Use curing compound only where approved by Engineer. Cure formed surfaces with curing compound applied in accordance with manufacturer's directions as soon as forms are removed and finishing is completed.
- D. Remove and replace concrete damaged by freezing.

3.09 FLOOR HARDENER

- A. Use where noted or scheduled.
- B. Follow manufacturer's application instructions.

3.10 FIELD TESTS

- A. Evaluation of Concrete Field Strength: In accordance with ACI 318/318R.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 03600
GROUT****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment and incidentals required and install grout complete as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Formwork is included in Section 03301
- B. Concrete Reinforcement is included in Section 03301
- C. Concrete Joints and Joint Accessories are included in Section 03301
- D. Cast-in-Place Concrete is included in Section 03301

1.3 SUBMITTALS

- A. Samples
 - 1. Samples of commercially manufactured grout products when requested by the Engineer.
 - 2. Aggregates for use in concrete grout when requested by the Engineer.
- B. Laboratory Test Reports
 - 1. Submit laboratory test data as required under Section 03300 for concrete to be used as concrete grout.
- C. Qualifications
 - 1. Grout manufacturers shall submit documentation that they have at least 10 years experience in the production and use of the proposed grouts which they will supply.

1.4 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes

GROUT

03600-1
CAM 16-1224
EXHIBIT 4
Page 397 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. ASTM C579 - Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes
 3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
 4. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 5. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics
- B. U.S. Army Corps of Engineers Standard (CRD)
1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Grout manufacturer shall have a minimum of 10 years experience in the production and use of the type of grout proposed for the work.

B. Services of Manufacturer's Representative

1. A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre-installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.

C. Field Testing

1. All field testing and inspection services required shall be provided by the Owner. The Contractor shall assist in the sampling of materials and shall provide any ladders, platforms, etc, for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.
2. The field testing of Concrete Grout shall be as specified for concrete in Section 03301.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.
- B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

GROUT

03600-2
CAM 16-1224
EXHIBIT 4
Page 398 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.
- D. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.
- E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

1.7 DEFINITIONS

- A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.

PART 2 PRODUCTS

2.1 GENERAL

- A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.
- B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Nonshrink Cementitious Grout

- 1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.
 - a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by Master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by The Euclid Chemical Co.; NBEC Grout by U. S. Grout Corp. or equal.
 - b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika

GROUT

03600-3
CAM 16-1224
EXHIBIT 4
Page 399 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Corp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U. S. Grout Corp. or equal.

B. Nonshrink Epoxy Grout

1. Nonshrink epoxy-based grout shall be a pre-proportioned, three component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 14,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum thermal expansion of 30×10^{-6} when tested in conformity with ASTM C531. The grout shall be Ceilcote 648 CP by Master Builders Inc.; Five Star Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout-Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co. or equal.

C. Cement Grout

1. Cement grouts shall be a mixture of one part portland cement conforming to ASTM C150, Types I, II, or III and 1 to 2 parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

D. Concrete Grout

1. Concrete grout shall conform to the requirements of Section 03300 except as specified herein. It shall be proportioned with cement, pozzolan, coarse and fine aggregates, water, water reducer and air entraining agent to produce a mix having an average strength of 2900 psi at 28 days, or 2500 psi nominal strength. Coarse aggregate size shall be in maximum. Slump should not exceed 5-in and should be as low as practical yet still retain sufficient workability.
2. Synthetic reinforcing fibers as specified in Section 03301 shall be added to the concrete grout mix at the rate of 1.5 lbs of fibers per cubic yard of grout. Fibers shall be added from the manufacturer's premeasured bags and according to the manufacturer's recommendations in a manner which will ensure complete dispersion of the fiber bundles as single monofilaments within the concrete grout.

E. Water

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 EXECUTION

3.1 PREPARATION

- A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.

GROUT

03600-4
CAM 16-1224
EXHIBIT 4
Page 400 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may effect the bond or performance of the grout.
- C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.
 - 1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.
- D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of baseplates prior to the installation of the grout.
- E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable to the Engineer. Upon completion of the 24 hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Engineer for each specific location of grout installation.
- F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.
- G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.
 - 1. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.
- H. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.
- I. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Engineer.

3.2 INSTALLATION - GENERAL

- A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.
- B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

GROUT

03600-5
CAM 16-1224
EXHIBIT 4
Page 401 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.
- D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.
- E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.
- F. Reflect all existing underlying expansion, control and construction joints through the grout.

3.3 INSTALLATION - CEMENT GROUTS AND NONSHRINK CEMENTITIOUS GROUTS

- A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.
- B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.
- C. Placements greater than 3-in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.
- D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.
- F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.
- G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the

GROUT

03600-6
CAM 16-1224
EXHIBIT 4
Page 402 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.4 INSTALLATION - NONSHRINK EPOXY GROUTS

- A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.
- B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.
- C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.
- E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.
- F. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.5 INSTALLATION - CONCRETE GROUT

- A. Screed underlying concrete to the grade shown on the Drawings. Provide the surface with a broomed finish, aligned to drain. Protect and keep the surface clean until placement of concrete grout.
- B. Remove the debris and clean the surface by sweeping and vacuuming of all dirt and other foreign materials. Wash the tank slab using a strong jet of water. Flushing of debris into tank drain lines will not be permitted.
- C. Saturate the concrete surface for at least 24 hours prior to placement of the concrete grout. Saturation may be maintained by ponding, by the use of soaker hoses, or by other methods acceptable to the Engineer. Remove excess water just prior to placement of the concrete grout. Place a cement slurry immediately ahead of the concrete grout so that the slurry is moist when the grout is placed. Work the slurry over the surface with a broom until it is coated with approximately 1/16 to 1/8-in thick cement paste. (A bonding grout composed of 1 part portland cement, 1.5 parts fine sand, an approved bonding admixture and water, mixed to achieve the consistency of thick paint, may be substituted for the cement slurry.)

GROUT

03600-7
CAM 16-1224
EXHIBIT 4
Page 403 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Place concrete grout to final grade using the scraper mechanism as a guide for surface elevation and to ensure high and low spots are eliminated. Unless specifically approved by the equipment manufacturer, mechanical scraper mechanisms shall not be used as a finishing machine or screed.
- E. Provide grout control joints as indicated on the Drawings.
- F. Finish and cure the concrete grout as specified for cast-in-place concrete.

3.6 SCHEDULE

- A. The following list indicates where the particular types of grout are to be used:
 - 1. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the plans except for base plates greater in area than 3-ft wide by 3-ft long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.
 - 2. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3-ft by 3-ft. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.
 - 3. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.
 - 4. Cement grout: Cement grout may be used for grouting of incidental base plates for structural and miscellaneous steel such as post base plates for platforms, base plates for beams, etc. It shall not be used when nonshrink grout is specifically called for on the Drawings or for grouting of primary structural steel members such as columns and girders.
 - 5. Concrete grout: Use for overlaying the base concrete to allow more control in placing the surface grade and elsewhere as shown on the Drawings.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 03720
CONCRETE SURFACE REPAIR SYSTEMS AND HYDROGEN SULFIDE LINER****PART I GENERAL****1.1 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. American Society for Testing and Materials (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - c. C78, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - d. C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
 - e. C348, Standard Test Method for Flexural Strength of Hydraulic Cement Mortars.
 - f. C496, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - g. C882, Standard Test Method for Bond Strength of Epoxy-Resin systems Used with Concrete by Slant Shear.
 - h. E699, Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by *ASTM Committee*.
 2. American Association of State Highway and Transportation Officials (AASHTO):
T277, Standard Method of Test for Rapid Deterioration of the Chloride Permeability of Concrete; Revised per Interim Specifications- Materials.

1.2 DEFINITIONS

- A. Low Pressure Spray Mortar: Mortar applied by low pressure spraying, or in small areas by hand troweling.

1.3 SUBMITTALS

- A. Written report signed and sealed by a Florida Structural Professional ENGINEER stating the findings of field investigations and repair recommendations for each wet well with supporting videotaped information. ENGINEER shall review and respond in writing within 5 working days of receipt of CONTRACTOR report.
- B. After construction is completed, the Florida Structural Professional ENGINEER as hired by the CONTRACTOR shall submit a signed and sealed report stating the repair work was completed in accordance with his design and state any deviations to his design that occurred during construction.
- C. Samples: One sample each of finished product as applied for both structural repair material and Structural repair with a hydrogen sulfide protection material applied over it.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

D. Quality Control Submittals:

1. Written description of material application procedures, including proposed application equipment, type of finish, and warranty.
2. Written description of equipment proposed for cleaning the wet wells prior to application of structural repair material.
3. Written description of equipment and methods proposed to remove soft concrete from wet wells after specified cleaning.
4. Certificates:
 - a. Structural repair material system manufacturer's certificate of proper installation.
 - b. Hydrogen sulfide protection material system manufacturer's certificate of proper installation.
5. Mockups: For each type of hydrogen sulfide protection material and structural repair material, prepare one 6-foot by 6-foot panel in each wet well.
6. Qualifications: Structural repair material and hydrogen sulfide protection material applicators. Experienced applicators endorsed by respective system manufacturers.

1.4 QUALITY ASSURANCE

A. Adhesion Testing:

1. The CONTRACTOR will perform adhesion testing on the materials used to structurally repair and/or hydrogen sulfide protect the wet wells as specified. The test shall be a uniaxial pull-off test which conforms to ACI503-30 Appendix A, A.I- "Field Test for Surface Soundness and Adhesion." Unless a minimum bond strength of 200 psi is achieved on each wet well location tested, the CONTRACTOR will not proceed with repair.
2. The CONTRACTOR shall repair any damage to the coatings resulting from the testing previously mentioned at his sole expense. Assume six locations will be tested in each wet well in addition to the mock-up panel.
3. The CONTRACTOR shall not perform adhesion test on mock-up panel for a minimum of 7 days. The CONTRACTOR shall proceed with application of the structural repair material until satisfactory adhesion test is achieved.

PART 2 PRODUCTS

2.1 STRUCTURAL REPAIR MATERIAL

A. The following listed structural repair materials are acceptable for use:

1. Mainstay ML-72, Mainstay Products Corporation, Roswell, GA
2. SewperCoat Calcium Aluminate Mortar as manufactured by LaFarge Aluminates, Chesapeake, VA
3. Or equal

2.2 HYDROGEN SULFIDE PROTECTION MATERIAL

A. The following listed hydrogen sulfide protection materials are acceptable for use:

1. Mainstay DS-5, Mainstay Products Corporation, Roswell, GA
2. Or equal.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. The manufacturer of selected hydrogen sulfide protection material shall approve in writing the application of their material over the damp structural repair material selected by the CONTRACTOR for use on this project.
- C. The CONTRACTOR shall furnish 3 years of experience on similar projects.

2.3 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.4 ACCESSORIES

- A. Mesh Reinforcement: Welded wire fabric with spacing of wires and wire size in accordance with ASTM A185 and ASTM A82, and mortar system manufacturer's recommendations.
- B. Tie Wire: 16-gauge galvanized.
- C. Mesh Anchors:
 - 1. Stainless steel Type 304 tie wire anchors.
 - 2. Manufacturer and Product: Hilti Fastening Systems; HKT -14.
- D. Finishing Aid Manufacturer and Product: Master Builders Inc., Cleveland, OH; Confilm.
- E. Rebar Coating Manufacturer and Product: Master Builders, Inc., Cleveland, OH; EMACO P22 flexible cementitious coating.

2.5 TEST EQUIPMENT

- A. Before construction begins, the CONTRACTOR shall obtain and be knowledgeable in the use of the following equipment:
 - 1. A high voltage holiday detector for thick film coatings as manufactured by Tinker and Razor, Model AP/W, San Gabriel, CA.
 - 2. Ten handheld pH pencils suitable for measuring pH of concrete surfaces as manufactured by Burrel Scientific, Model Insta-Check Surface pH pencil, No. P-13N, Pittsburgh, PA.
- B. This test equipment shall be used for monitoring and testing requirements.
- C. The test equipment shall be stored at the project site for the CONTRACTOR'S daily use and shall be maintained in accurate, working conditions at all times. The test equipment shall be available to the ENGINEER for testing purposes.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 3 EXECUTION**3.1 PREPARATION OF SURFACES**

- A. Surfaces to receive this coating system shall be free of dust, loose particles, oils, grease, chemical contaminants, attacked concrete, and previously applied protective coatings and have a minimum pH of 10.
- B. All surfaces to be coated shall be cleaned by hydroblasting or abrasive blasting to minimum amplitude roughness of 3/16 inch. Minimum nozzle pressure for hydroblasting shall be 10,000 psi; 40 psi for abrasive blasting. Hydroblasting shall be completed using potable water. Only nonsilica abrasives shall be used for abrasive blasting.
- C. Do not use power-driven jackhammers and chipping hammers, except as might be allowed as noted hereinafter in Paragraph PREPARATION OF SURFACES, Item D.
- D. If the CONTRACTOR desires to propose a method using 3,000 psi water blast with sand, preceded by use of light chipping hammers, he may do so. In order to be approved as an acceptable alternate method, the CONTRACTOR shall demonstrate that the proposed method shall not result in fracturing of sound concrete, and shall provide the specified amplitude.
- E. During surface preparation activities, the CONTRACTOR shall regularly (approximately every 100 square feet) measure the surface pH using pH test pencils or other test to verify compliance with these Specifications. Surfaces not meeting the requirements shall be marked and reblasted.
- F. The CONTRACTOR shall remove all debris from the wet well and shall bear all costs for proper disposal.
- G. Collect and dispose of water from removal operations in manner and location acceptable to OWNER.
- H. Following completion of surface preparation, all active hydrostatic leaks shall be plugged by use of a waterstop material. All structural defects, voids, or cracks in the substrate shall be repaired prior to the application of the underlayment or monolithic lining. Repair materials shall be approved by the lining manufacturer.
- I. Remove concrete minimum of 1 inch clearance around rebar for application and bonding of new mortar to entire periphery of exposed rebar for the following surface conditions exists:
 - 1. 50 percent or more of periphery around rebar is exposed during removal of concrete.
 - 2. 25 percent or more of periphery around rebar is exposed during removal of concrete and corrosion has eventuated to the extent that loss of section has occurred.
 - 3. Bond between existing concrete and reinforcement has deteriorated.
- J. Clean exposed reinforcing bars of rust and concrete, and coat with flexible cementitious coating.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.2 STRUCTURALLY REPAIR ENTIRE WET WELL

- A. The cleaned substrate will be video-taped, submitted, inspected and approved by the ENGINEER before the application of any structural repair material. Provide 24-hour notification. ENGINEER shall respond in writing within 72-hours of receipt of video-tape and CONTRACTOR report.
- B. Mix and apply underlayment in accordance with the lining manufacturer's written recommendations. Apply structural repair material to return it to original as-constructed levels with a final thickness of 0.5 inch, minimum. Build-up of thicknesses greater than 1 inch and those overhead require the use of reinforcing mesh. Refer to the manufacturer's specific instructions and recommendations for the details of the installation of the reinforcement. Finish shall be sponge float. Brush finish will not be allowed.

3.3 COATING APPLICATION

- A. Mix and apply hydrogen sulfide protection material in accordance with the coating manufacturer's recommendations.
- B. Install by spraying the coating at a minimum 120 mils thickness. Follow coating manufacturer's specific recommendations to ensure installation of the minimum thickness and a pinhole free surface.

3.4 FIELD TESTING

- A. After the coating application is complete and has cured, the CONTRACTOR shall electrically test the monolithic coating for holidays and discontinuities following the manufacturer's recommended methods and test voltages. Testing shall be performed in the presence of ENGINEER. Any area that has insufficient thickness, contains holidays or other imperfections shall be repaired in accordance with the coating manufacturer's recommendations.

3.5 MANUFACTURERS' SERVICES

- A. Provide structural repair material and hydrogen sulfide protection material representative at site for mockup installation assistance, inspection and certification of proper installation, and training of mortar system applicators.
- B. The Florida Structural Professional ENGINEER as hired by the CONTRACTOR shall be at the site during the following periods:
 - 1. Start of project for mockup panel.
 - 2. During adhesion testing of mockup panels.
- C. To inspect work midway through completion.
- D. At the completion of project.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. After construction is completed, the Florida Structural Professional ENGINEER as hired by the CONTRACTOR shall submit a signed and sealed report stating the repair work was completed in accordance with his design and state any deviations to his design that occurred during construction.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 03740
MODIFICATIONS TO EXISTING CONCRETE****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment and incidentals required to cut, remove, repair and modify parts of existing concrete structures as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Cast in place concrete and reinforcing is included in Section 03301.
- B. Grout is included in Section 03600.

1.3 SUBMITTALS

- A. The CONTRACTOR shall submit for review, as provided in article entitled "Shop Drawings and Submittals" of the General Conditions and Section 01300, manufacturer's technical literature for epoxy bonding agent and epoxy paste. Include in the submittal the manufacturer's installation and/or application instructions.

1.4 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C881 Standard Specification for Epoxy Resin Base Bonding Systems for Concrete.
- B. Where reference is made to the above standard, the revision in effect at the time of bid opening shall apply.

1.5 QUALITY ASSURANCE

- A. Do not shift, cut, remove, or otherwise alter any existing structure or concrete until authorized by the ENGINEER.
- B. When removing materials or portions of existing structures or when making openings in existing structures, erect barriers, shoring and bracing and other protective devices to prevent damage to the structures beyond the limits of new work, protect personnel, control dust and prevent damage by flying debris.
- C. Unless otherwise indicated or specified, cut existing concrete by line drilling.
- D. Manufacturer qualifications. Have a minimum of ten years experience within the last ten years in the manufacture and use of the products specified and have an ongoing program of training, certifying and technically supporting the CONTRACTOR'S personnel.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. CONTRACTOR qualifications. Complete a program of instruction in the application of the approved manufacturer's material and provide certification from the manufacturer attesting to their training and status as an approved applicator.
- F. Furnish a notarized certificate stating that the materials to be provided meet the requirements of this Section and have the manufacturer's current printed literature on the specified product.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original, unopened containers clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.
- B. Store and condition products as recommended by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

- 1. Materials shall comply with this Section and any Federal, State or local VOC limitations.

B. Epoxy Bonding Agent

- 1. Provide a two component, solvent-free, asbestos free moisture insensitive epoxy resin material used to bond plastic concrete to hardened concrete where indicated on the Drawings and complying with the requirements of ASTM C881, Type II, Grade 2. Epoxy bonding agent shall be Sikadur 32, Hi Mod by Sika Corporation, Lyndhurst, NJ; Epoxy Adhesive CR631 by Sto Concrete Restoration Division, Amherst, MA; Euco 452MV by Euclid Chemical Co., Cleveland, OH, or equal.

C. Epoxy Paste

- 1. Provide a two component, solvent free, asbestos free, moisture insensitive epoxy resin material used to bond dissimilar materials to concrete such as setting dowels and anchor bolts into hardened concrete where indicated on the Drawings and complying with the requirements of ASTM C881, Type I, Grade 3. Epoxy paste shall be Sikadur 31, Hi Mod Gel by Sika Corporation, Lyndhurst, NJ; Epoxy Gel CR635 by Sto Concrete Restoration Division, Amherst, MA; Concsive Paste SPL by Master Builders Inc., Cleveland, OH, or equal.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 3 EXECUTION**3.1 GENERAL**

- A. Cut, repair, remove, and modify parts of the existing structures as indicated on the Drawings and as specified herein. Finishes, joints, reinforcements and sealants are specified in their respective sections. All work shall comply with the requirements of this Section and as indicated on the Drawings.
- B. All commercial products shall be stored, mixed and applied in strict compliance with the manufacturer's recommendations and as specified in Paragraph 1.06.
- C. Where concrete is repaired in the vicinity of an expansion joint or control joint, preserve the isolation between components on either side of the joint.
- D. When drilling holes for dowels/bolts, stop drilling if reinforcing is encountered. As approved by the ENGINEER, relocate the hole to avoid reinforcing. Do not cut reinforcing without prior approval by the ENGINEER. Where possible, identify reinforcing locations prior to drilling using "rebar locators" so that drill hole locations may be adjusted to avoid reinforcing interference.

3.2 CONCRETE REMOVAL

- A. When removing concrete, line drill at limits of removal. Remove concrete such that existing concrete and reinforcing to be left in place and existing equipment in place are not damaged. Sawcut at limits of concrete to be removed only where shown on the Drawings, specified, or when written approval from the ENGINEER has been obtained.
- B. Where existing reinforcing is exposed due to concrete removal and no new material is to be placed on the cut surface, apply a 1/4-in thick coating or surface treatment of epoxy paste to the entire cut surface.
- C. Where the joint between new concrete or grout and existing concrete will be exposed in the finished work, the edge of concrete removal shall be a 1 in deep sawcut on each exposed surface of the existing concrete except as otherwise indicated on the Drawings or specified herein.
- D. Repair or replace concrete specified to be left in place which is damaged during concrete modifications as directed by the ENGINEER at no additional cost to the OWNER.

3.3 CONNECTION SURFACE PREPARATION

- A. Prepare connection surfaces as specified below for concrete areas requiring patching, repairs or modifications as indicated on the Drawings, specified herein, or as directed by the ENGINEER.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Remove all loose and deteriorated materials, dirt, oil, grease, and all other bond inhibiting materials from the surface by dry mechanical means such as sandblasting, chipping or wire brushing. Uniformly roughen the concrete surface to approximately 1/4-in amplitude. Thoroughly clean surface of loose or weakened material and dust by dry mechanical means such as sandblasting and airblasting. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded into parent concrete.
- C. If reinforcing steel is exposed, clean it by dry mechanical means to remove all loose material, contaminants and rust as approved by the ENGINEER. If half of the diameter of the reinforcing steel or more is exposed, chip out a minimum of 1-in of concrete behind the steel. Do not damage reinforcing to be incorporated in new concrete while removing existing concrete.
- D. Clean exposed reinforcing that is to be incorporated in new concrete. Use dry mechanical means to remove all loose material, contaminants, and rust before proceeding. Cut, bend or lap existing reinforcing to new reinforcing as indicated with allowance for 1-in minimum cover all around.
- E. Prepare concrete surfaces in accordance with the following as indicated, specified or as directed by the ENGINEER.
 - 1. Method A: After the existing concrete surface at connection has been roughened and cleaned, thoroughly saturate with water and maintain saturation for a period of at least 12 hours. Brush on a 1/16 in layer of cement and water mixed to the consistency of a heavy paste. Immediately after application of cement paste, place new concrete or grout mixture as indicated.
 - 2. Method B: After the existing concrete surface has been roughened and cleaned, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall comply strictly with the manufacturer's recommendations. Place new concrete or grout mixture as indicated within time constraints recommended by the manufacturer to ensure bond.
 - 3. Method C: Drill a hole 1/4 in larger than the diameter of the dowel or bolt. The hole shall be blown clear of loose particles and dust just prior to installing epoxy paste. The drilled hole shall first be filled with epoxy paste, then dowel/bolt shall be buttered with paste and inserted with a twisting motion. Unless otherwise indicated, deformed bars shall be drilled and set to a depth of ten bar diameters and smooth bars shall be drilled and set to a depth of 15 bar diameters. Remove excess epoxy paste before it hardens.
 - 4. Method D: Combination of Method B and C.

3.4 GROUTING

- A. Grouting shall be as specified in Section 03600.

END OF SECTION

PROJECT 11880

SECTION 05500
METAL FABRICATIONS AND CASTINGS

PART 1 GENERAL**1.1 REFERENCES**

A. The following is a list of standards which may be referenced in this Section:

1. Aluminum Association, Inc. (AA): Standards, Specifications, and Data.
2. American National Standards Institute (ANSI):
 - a. A14.3, Ladders, Fixed, Safety Requirements.
 - b. B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
3. American Society for Testing and Materials (ASTM):
 - a. A36, Standard Specification for Structural Steel.
 - b. A48, Standard Specification for Gray Iron Castings.
 - c. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - d. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - e. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware (R 1987).
 - f. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - g. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - h. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
 - i. A276, Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
 - j. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - k. A325, Standard Specification for High-Strength Bolts for Structural Steel Joints.
 - l. A385, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip) (R 1991).
 - m. A395, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
 - n. A489, Standard Specification for Carbon Steel Eyebolts.
 - o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - p. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - q. A525, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

PROJECT 11880

- r. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- s. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Shapes.
- t. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- u. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- v. D648 E2, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load (R 1988).
- w. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
- x. D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact (R 1987).
- y. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
- z. D1505, Standard Test Method for Density of Plastics by the Density-Gradient Technique (R 1990).
- aa. D1525, Standard Test Method for Vicat Softening Temperature of Plastics.
- bb. F436, Standard Specification for Hardened Steel Washers.
- cc. F468, Standard Specification for Nonferrous Nuts for General Use.
- dd. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- 4. American Welding Society (AWS):
 - a. AWS D1.1, Structural Welding Code-Steel.
 - b. AWS D1.2, Structural Welding Code-Aluminum.
- 5. Federal Specifications (FS):
 - a. QQ-F-461C(1), Floor Plate, Steel, Rolled 5/4/77.
 - b. RR-S-001301.

1.2 DEFINITIONS

- A. Submerged: A location at or below a point 1 foot 6 inches above maximum water surface elevation in water-holding basins and channels.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Metal fabrications, including welding and fastener information.
 - 2. Specific instructions for all phases of installation including hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.
- B. Quality Control Submittals:

METAL FABRICATIONS AND CASTINGS

CM 450-0229
03500-2
EXHIBIT 4

PROJECT 11880

1. Vinyl Ester and Epoxy Anchors:
 - a. Manufacturer's Certificate of Compliance.
 - b. Manufacturer's past project experience data.
 - c. Test reports for each batch of vinyl ester or epoxy delivered to site.
 - d. Manufacturer's Certificate of Qualification for installers.
 - e. Current test data indicating that cured adhesive anchors meet or exceed design loads.
2. Ladders: Results of load tests.
3. Welders: Evidence of certification.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Welders: Certified in accordance with AWS D1.1, Chapter 5.
2. Vinyl Ester and Epoxy Anchor Manufacturers: Experience on at least three similar projects within the last 3 years.
3. Vinyl Ester and Epoxy Anchor Installers: Trained and certified by manufacturer.

B. Regulatory Requirements:

1. Anchoring Systems:
 - a. Current evaluation and acceptance reports by ICBO or other similar code organization.
 - b. Acceptable for use in potable water structures by EPA and local health agencies or NSF.

C. Welding Procedures: Follow the requirements of AWS D1.1 and AWS D1.2.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Shipment:

1. Insofar as practical, factory assemble items specified herein.
2. Package and clearly tag parts and assemblies that are of necessity shipped unassembled, in a manner that will protect materials from damage, and facilitate identification and field assembly.

B. Storage of Epoxy Adhesive:

1. Store epoxy cartridges on pallets or shelving in a covered storage area.
2. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.

C. Storage of Vinyl Ester Products:

PROJECT 11880

1. Store components on pallets or shelving in a covered storage area with locking door.
2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.

PART 2 PRODUCTS**2.1 MATERIALS**

A. Unless Otherwise Indicated, Meet the Following Requirements:

Item	ASTM Specification
Steel Shapes and Plates	A36
Steel Pipe	A501 or A53, Type E or S, Grade B
Structural Steel Tubing	A500, Grade B
Stainless Steel:	
Bars and Shapes	A276, AISI Type 316
Steel Plate, Sheet, and Strip	A167, AISI Type 316
Bolts and Threaded Rods	A193, AISI Type 316, B8MN, B8M2, or B8M3
Nuts	A194, AISI Type 316, B8MN, B8M2, or B8M3
Steel Bolts and Nuts:	
Carbon Steel	A307 or A3690
High-Strength	A325, Type 3
Galvanized Steel Bolts and Nuts	A307 or A36, with A153 Zinc Coating, and ANSI B1.1
Eyebolts	A489
Threaded Rods	A36
Flat Washers (Unhardened)	F844; use A153-82 for Zinc Coating
Flat Washers (Hardened)	F436
Aluminum, Structural Shapes, and Plates	B209 and B308, Alloy 6061-T6
Aluminum Bolts and Nuts	F468, Alloy 2024-T4
Cast Iron	A48, Class 35

B. Checkered Plates:

METAL FABRICATIONS AND CASTINGS

CM 500-224
EXHIBIT 4

PROJECT 11880

1. Steel: Federal Specification QQ-F-461, Class I, minimum 1/4 inch; galvanize after fabrication.
 2. Aluminum: ASTM B209, Alloy 6061-T6, tread plate, thickness minimum 1/4 inch.
- C. Anchor Bolts: As shown in Fastener Schedule at the end of this Section and as specified in various equipment sections.
- D. Anchor Bolt Sleeves:
1. High Density Polyethylene Plastic:
 - a. Single unit construction with deformed sidewalls such that the concrete and grout lock in place.
 - b. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
 - c. Material requirements:
 - 1) Plastic: High density polyethylene.
 - 2) Density: ASTM D1505.
 - 3) Vicat Softening Point: ASTM D1525.
 - 4) Brittleness Temperature: ASTM D746.
 - d. Manufacturer: Sinco West, Simi Valley, CA.
 2. Fabricated Steel Sleeve: A36 steel.
- E. Antiseizing Lubricant: Lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper. Use Loc Tite Co., Permatex.

2.2 ANCHORING SYSTEMS FOR CURED CONCRETE

- A. Wedge Anchors:
1. AISI Type 316 stainless steel throughout.
 2. Manufacturers and Products:
 - a. ITW Ramset/Red Head, Wood Dale, IL; Trubolt Wedge Anchor.
 - b. Hilti, Inc., Tulsa, OK; Kwik-Bolt II Stud Anchor.
 - c. Wej-It Corp., Broomfield, CO; Wej-It Anchor Bolt.
 - d. Molly Division of Emhart Corp., Temple, PA; Parabolt Concrete Anchor.
- B. Expansion Anchors:
1. Self-drilling anchors, snap-off type or flush type.
 2. Furnish anchors for use with galvanized bolts.
 3. Nondrilling Anchors: Flush type for use with bolt, or stud type with projecting threaded stud.
 4. Manufacturers and Product:
 - a. ITW Ramset/Red Head, Wood Dale, IL; Multi-Set Anchor.
 - b. Hilti, Inc., Tulsa, OK; Hilti HDI Drop-In Anchor.

PROJECT 11880

C. Epoxy Anchors:

1. Anchor Rod: Stainless steel threaded rod free of grease, oil, or other deleterious material with a 45 degree chisel point.
2. Epoxy Adhesive:
 - a. ASTM C881, Type 1, Grade 3, Class A, B, or C.
 - b. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments and gray in color.
 - c. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
3. Mixed Epoxy Adhesive: Nonsag paste consistency, with ability to remain in a 1 inch diameter overhead drilled hole without runout, having the following properties:
 - a. Slant Shear Strength, ASTM C881, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.
 - b. Compressive Strength, ASTM D695: 14,000 psi, minimum.
 - c. Tensile Strength, ASTM D695: 4,500 psi.
 - d. Heat Deflection Temperature, ASTM D648 E2: 135 degrees F, minimum.
4. Epoxy Adhesive Packaging:
 - a. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
 - b. Cartridge Markings: Include manufacturer's name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
5. Manufacturers and Products:
 - a. Adhesives Technology Corp.; Anchor-It Fastening Systems, HS 200 Epoxy Resin.
 - b. ITW Ramset/Red Head; Epcon Ceramic 6 Epoxy Anchor System.
 - c. Covert Operations; CIA Epoxy Anchors with viscosity to suit application.
 - d. Rawlplug Co., Inc.; Rawl/Sika Foil Fast Epoxy Injection Gel System.

D. Adhesive Anchors:

1. Two-component vinyl ester adhesive, insensitive to moisture, designed to be installed in adverse freeze/thaw environments.
2. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
3. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
4. Anchor Rods: Stainless steel threaded rods, sized by adhesive manufacturer for design loads required and adhesive system used.

PROJECT 11880

5. Manufacturer and Product: Hilti, Inc.; HIT Doweling Anchor System (HIT C-100).

2.3 ACCESS COVERS

A. Doors:

1. Exterior type waterproof aluminum single- or double-leaf.
2. Component Fabrication:
 - a. Access Door Leaf(s): H-20 rated with 1/4 inch diamond pattern plate and reinforcing on underside to withstand a live load equal to AASHTO H20 requirements with a maximum deflection of 1/150th of the span.
 - b. Channel Frame: 1/4 inch with full anchor flange around perimeter.
 - c. Equip door(s) with heavy stainless steel hinges with stainless steel pins.
 - d. Hinges:
 - 1) Through-bolt to cover with tamper-proof stainless steel bolts or "lock bolts" to resist vandalism.
 - 2) Through-bolted to frame with stainless steel bolts and fiber locknuts.
 - e. Equip doors with fully enclosed and lubricated compression springs with lower enclosing telescopic tube locked into supporting "boot" firmly attached to frame to retard downward motion of door leaves or corrosion-resistant stainless steel gas springs designed to limit to 17 pounds the lifting force required to open.
 - f. Equip doors with hold-open arm with positive locking device with conveniently positioned release handle for easy and controlled closing.
 - g. Equip doors with recessed staple/hasp for padlock.
 - h. Furnish stainless steel snap lock mounted on bottom of leaf with removable topside handle and socket recessed in cover and provided with threaded plug for flush surface with handle removed.
 - i. Locate 1-1/2 inch drainage coupling in front right corner of channel frame.
 - j. Hardware: Type 316 stainless steel.
3. Aluminum Finish: Mill finish with bituminous coating applied to surfaces in contact with concrete.
4. Reinforced for H-20 wheel loading.
5. Manufacturers:
 - a. Bilco Co., New Haven, CT.
 - b. Thompson Fabricating Co., Birmingham, AL.
 - c. Halliday Products, Orlando, FL.

B. Heavy-Duty Cast Iron Slab Type Manhole Frame and Lid:

METAL FABRICATIONS AND CASTINGS

CA 05500-227
EXHIBIT 4

Page 421 of 663

PROJECT 11880

1. To be used where vault or well access is located in areas subject to vehicular travel.
2. Frame and cover shall have an H-20 wheel load rating.
3. Slab type manhole frame and lid with flush, waterproof lift handles, and solid bronze Type R butt hinges.
4. Covers shall lock in the fully opened position.
5. ASTM A48, Class 35 cast iron.
6. Manufacturers:
 - a. Neenah Foundry Co., Series R663.
 - b. US Foundry Co.
7. Frames and lids shall be rectangular and sized as shown on the Drawings.

PART 3 EXECUTION**3.1 FABRICATION****A. General:**

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Material Thinner than 1/8 Inch: Either galvanize before fabrication in accordance with ASTM A525, Coating Designation G210, or after fabrication in accordance with ASTM A123, except the weight of zinc coating shall average minimum 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1 ounce per square foot.

B. Aluminum:

1. Fabricate in accordance with the Aluminum Association Standards and manufacturers' recommendations as approved.
2. Grind smooth sheared edges exposed in finished work.

3.2 WELDING**A. Steel:**

1. Meet requirements of AWS D1.1 for techniques of welding employed, appearance, quality of welds made, and the methods of correcting *defective* work.
2. Meet visual acceptance standards of AWS D1.1, paragraph 8.15.1.

PROJECT 11880

3. Complete welding before applying finish.

B. Aluminum: Meet requirements of AWS D1.2.

3.3 INSTALLATION OF METAL FABRICATIONS

A. General:

1. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
2. Install rigid, substantial, and neat in appearance.
3. Erect steel in accordance with applicable portions of AISC Code of Standard Practice, except as modified.
4. Install manufactured products in accordance with manufacturer's recommendations.
5. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
6. Field weld components indicated.
7. Perform field welding in accordance with AWS D1.1.
8. Obtain ENGINEER approval prior to site cutting or making adjustments not scheduled.
9. After erection, apply prime or galvanize coating to welds, abrasions, and surfaces not in contact with concrete.

B. Erection Tolerances:

1. Maximum Offset from True Alignment: 1/4 inch.

C. Aluminum:

1. Erection: In accordance with the Aluminum Association specifications.
2. Do not remove mill markings from concealed surfaces.
3. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.

D. Pipe Sleeves:

1. Provide where pipes pass through concrete or masonry.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide a center flange for water stoppage on sleeves in exterior or water-bearing walls.
4. Provide a rubber caulking sealant or a modular mechanical unit to form a watertight seal in the annular space between pipes and sleeves.

PROJECT 11880

3.4 ANCHOR BOLTS

- A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.
- B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt. Minimum bolt size: 1/2 inch diameter by 12 inches long, unless otherwise shown.

3.5 ANCHORING SYSTEMS FOR CONCRETE

- A. Begin installation only after concrete or masonry receiving anchors have attained design strength.
- B. Do not install an anchor closer than six times its diameter to either an edge of concrete or masonry, or to another anchor, unless specifically shown otherwise.
- C. Install in accordance with manufacturer's specific quality control submittal instructions. Hole diameters are critical to installation, use only drills recommended by anchor manufacturer. Follow manufacturer's safe handling instructions.
- D. Epoxy or Adhesive Anchors: Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F, unless stated otherwise in manufacturer's written instructions.
- E. Follow specific manufacturer safe handling practices when handling and installing concrete anchors.

3.6 ACCESS COVERS

- A. Accurately position prior to placing concrete, such that covers are flush with floor surface.
- B. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.
- C. Sidewalk Door:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Doors shall operate to satisfaction of Engineer.

3.7 ELECTROLYTIC PROTECTION

- A. Aluminum:
 - 1. Solvent clean and prime the surfaces in accordance with manufacturer's instructions.

METAL FABRICATIONS AND CASTINGS

CM 450-12240
EXHIBIT 4

PROJECT 11880

2. Where in contact with dissimilar metals, or embedded in masonry or concrete, protect surfaces with 1 coat, 10 MDFT of bituminous paint.
3. Allow paint to dry before installation of the material.
4. Protect painted surfaces during installation.
5. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.

3.8 MANUFACTURERS' SERVICES

- A. Epoxy and Vinyl Ester Anchors: Conduct site training of installation personnel for safe and proper installation, handling, and storage of epoxy or vinyl ester adhesive system. Notify ENGINEER of time and place for sessions.

3.9 FASTENER SCHEDULE

- A. Provide Fasteners as Follows:

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases:		
Dry Areas	Stainless steel "J" bolts, unless otherwise specified with equipment	
Submerged or Wet Areas	Stainless steel "J" bolts with fusion bond coating unless otherwise specified with equipment	1 or 2 coats, 7 MDFT of Fusion Bonded Coating 100 percent Solids Epoxy or Polyurethane.
Anchor Bolts Cast Into Concrete for Metal Fabrications and Structural Components:		
Dry or Protected Areas	Stainless steel bolts	
Exterior, Wet, Washdown, and Chemical Handling Areas	Stainless steel bolts with fusion bond coating	3 coats, 250 SFPGPC of Polyamide Epoxy, High Solids.
Anchors for Metal Components to Concrete; e.g., Electrical Panels and Equipment:		
Dry Areas	Galvanized or stainless steel wedge or expansion anchors	
Wet and Damp Areas	Epoxy or adhesive stainless steel anchors	
Submerged or Buried in Earth	Epoxy or adhesive stainless steel anchors	
Connections for Steel Fabrications and Wood Components:		
Exterior and Interior	Stainless steel bolts	
Connections of Aluminum Components:		

METAL FABRICATIONS AND CASTINGS

CM 450-12241
EXHIBIT 4

PROJECT 11880

Service Use and Location	Product	Remarks
Exterior and Interior	Stainless steel bolts	
All Others:		
Exterior and Interior	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on all stainless steel threads.
- C. Do not use epoxy anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

PROJECT 11880

**SECTION 05515
ALUMINUM LADDERS AND ACCESSORIES****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment and incidentals required and provide complete ladders and accessories as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Miscellaneous Metals are included in Section 05500.

1.3 SUBMITTALS

- A. Submit, in accordance with Section 01300, manufacturer's shop drawings to indicate compliance with this Section. Show locations, methods of supporting, methods of anchoring and finishes.

1.4 REFERENCE STANDARDS

- A. Occupational Safety and Health Administration (OSHA).
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 PRODUCTS**2.1 FIXED WALL LADDERS**

- A. Fixed wall ladders and accessories shall comply with all requirements of OSHA, 29 CFR 1910.27.
- B. Manufacturers
 - 1. Precision Stair Corp.
 - a. Model FL - (length as scheduled)
 - 2. O'Keeffe's Inc. Model 520-CH (Standard)
 - 3. Aluminex, Inc. Model 530-SC (Safety Cage)
 - a. Model LC-100 (Standard)
 - b. Model LC-300 (Safety Cage as detailed on the Drawings)
 - c. Or Equal.
- C. Materials
 - 1. Side Rails/Safety Cages. Aluminum plates, alloy 6061-T6 or aluminum extrusions, alloy 6063-T5. Where extensions are provided, the side rail shall be channel shapes having a wall thickness not less than .125-in and a depth of not less than 3-in.

PROJECT 11880

2. Rungs/Treads. Knuckled or serrated aluminum bars, not less than 3/4-in in diameter fabricated of alloy 6061-T6. Alternatively, serrated tubular aluminum extrusions of alloy 6063-T5/T6 not less than 1-1/4-in square. Attach rungs to side rails with self-locking Type 316 stainless steel fasteners or full penetration welds.
3. Wall/Floor Support Brackets. Aluminum plates, alloy 6061-T6. T316 fasteners/rigid attack/locking.

2.2 LADDER SAFETY POST EXTENSION

- A. Fixed ladders occurring below hatch doors shall be provided with attached telescoping tubular safety post extension, unless otherwise noted. Unit shall be completely assembled with stainless steel fasteners and brackets for securing to the ladder rungs provided by the manufacturer. Provide corrosion resistant construction.
- B. Manufacturers
 1. Bilco - ladder UP Safety Post, Model 2 or equal.

2.3 FALL PREVENTION SYSTEM

- A. Fall Prevention System
 1. Provide complete rigid-rail and locking sleeve fall prevention system such as "Saf-T-Climb" by North Consumer Products (Division of Siebe North, Inc.) or equal at locations noted on the Drawings. System shall be complete with all mounting hardware and accessories furnished in the same metal as the rail unless otherwise noted.
 2. Rail material shall be aluminum alloy 6061-T6 with bronze sleeves.
 3. Provide basic system accessories including: two bronze locking climbing sleeves (Saf-T-Lok Sleeve) two climbing belts (Saf-T-Belt), two harnesses (Saf-T-Climb Harness), removable extension kit.
 4. Where ladder begins below the access platform of a structure (eg: meter vaults, hatchways, etc,) provide a permanently installed mandril at each ladder to allow use of the removable extension previously specified.
- B. Fabrication
 1. Details shall be as shown on the Drawings and as specified.
 2. Components shall be free of splinters, sharp edges, burrs or hazardous projections.
 3. For ladders, round or cap top ends of side rails. Grind welds on exterior face of siderails or stringers smooth. Accurately fabricate joints for neat, tight fit.
 4. Attachments not made by welding shall be made with self-locking Type 316 stainless steel fasteners.
 5. Mill finish unless otherwise noted. Ship with a shop coat of methacrylate lacquer.

PROJECT 11880

PART 3 EXECUTION**3.1 INSTALLATION**

- A. Install ladders and accessories in compliance with manufacturer's shop drawings and detailed instructions.
- B. Install fabrications, plumb, square and level and securely anchored to supports. Smooth and adjust miters and field cuts to assure tight joints.
- C. Where aluminum contacts a dissimilar metal, apply to the dissimilar a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint.
- D. Where aluminum contacts masonry or concrete, apply a heavy coat of acceptable alkali resistant bituminous or epoxy paint to the masonry or concrete.

3.2 PROTECTION

- A. Protect aluminum fabrications from damage due to work of adjacent trades.

3.3 CLEANING

- A. As work progresses, remove debris and leave installation sites broom clean.
- B. Prior to final acceptance, clean ladders of any paint, mud or other adherents.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 099610
PAINT COATINGS****PART I - GENERAL**

- 1.1 This specification defines the methods of surface preparation, coating systems, and methods of application for painting as outlined herein.
- 1.2 The Contractor shall furnish all supervision, labor, tools, materials, equipment, scaffolding or other structures, and supervision required for the transportation, unloading, storage, and application of the paint and associated products covered by this specification.
- 1.3 The work includes painting and finishing of interior and exterior exposed items above and below grade surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, pipe, handrails, posts, fittings, valves, pumps, tanks, equipment, and all other work obviously required to be painted unless otherwise specified herein or on the drawings. The omission of minor items in the schedule of work shall not relieve the contractor of his obligation to include such items where they come within the general intent of the specification as stated herein.
- 1.4 **SURFACES NOT TO BE COATED:**
 1. Any code requiring labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
 2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.
 3. Aluminum handrails, walkways, windows, louvers, and grating unless otherwise specified herein.
 4. Signs and nameplates.
 5. Finished hardware.
 6. Stainless steel angles, tubes, pipe, etc.
 7. Products with polished chrome, aluminum, nickel, or stainless steel finish.
 8. Plastic switch plates and receptacle plates.
 9. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.
 10. Galvanized Air Ducts.
- 1.5 All work shall be done in strict accordance with this specification, the design drawings and the painting package, including manufacturer's printed instructions.

PAINT COATINGS

099610 - 1
CAM 16-1224
EXHIBIT 4
Page 430 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- 1.6 The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules, and regulations promulgated by authorities having jurisdiction, which may bear on the work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970."
- 1.7 Wherever the word "Engineer" occurs in this specification, it shall apply to the authorized representative of the PUBLIC WORKS DIRECTOR. Where the word "Contractor" occurs in this specification, it shall apply to the contractor performing any part of or all of this work.

2. DEFINITIONS

- 2.1.1 Field Painting is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.
- 2.1.2 Shop Painting is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.
- 2.2 Abbreviations The abbreviations and definitions listed below, when used in this specification, shall have the following meanings:
- 2.2.1 SSPC – Society for Protective Coatings
 - 2.2.2 Exterior – Outside, exposed to weather
 - 2.2.3 Interior Dry – Inside, not subject to immersion service
 - 2.2.4 Interior Wet – Inside, subject to immersion service
 - 2.2.5 ASTM – American Society of Testing Materials
 - 2.2.6 NACE – National Association of Corrosion Engineers
 - 2.2.7 NSF – National Sanitation Foundation (Standard 61)
 - 2.2.8 AWWA – American Water Works Associates (AWWA D102-97)
 - 2.2.9 ICRI – International Concrete Repair Institute
 - 2.2.10 CSP – Concrete Surface Profile (1-9)

3. SERVICES OF MANUFACTURERS REPRESENTATIVE

- 3.1 Contractor shall arrange a meeting prior to the start of painting or flooring installation, between the Contractors, the Paint Manufacturer, whose products are to be used, and the Engineer. All aspects of surface preparation, application and coating systems as covered by this specification will be reviewed at this meeting. There shall be no additional compensation for this service, and contractor shall allow for such in his bid pricing.
- 3.2 Clarification shall be requested promptly from the Engineer when instructions are lacking, conflicts occur in the specification, or the procedure seems improper or inappropriate for any reason.
- 3.3 Copies of all manufacturer's instructions and recommendations shall be furnished to the Engineer by the Painting Contractor.

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- 3.4 Contractor shall arrange to have a factory representative from the paint manufacturer to inspect all completed paintwork and submit a report to the Engineer verifying that the products used were proper for the exposure and service intended and were properly applied. There shall be no additional compensation for this service. All shall be allowed for in the contractors bid prices.

4. SAFETY AND HEALTH REQUIREMENTS

In accordance with requirements of OSHA Safety and Health Standards for Construction (29CFR1926) and the applicable requirements of regulatory agencies having jurisdiction, as well as manufacturer's printed instructions, appropriate technical bulletins, manuals, and material safety data sheets, the CONTRACTOR shall provide and require use of personnel protective and safety equipment for persons working in or about the project site.

Respirators shall be worn by persons engaged or assisting in spray painting. The CONTRACTOR shall provide ventilating equipment and all necessary safety equipment for the protection of the workmen and the work.

All paint shall comply with all requirements of the Air Pollution Regulatory Acts concerning the application and formulation of paints and coatings for an area in which the paints are applied. Specifically, paints shall be reformulated as required to meet the local, State and Federal requirements.

5. SUBMITTALS

The CONTRACTOR shall submit paint manufacturer's data sheets and samples of each finish and color to the ENGINEER for review, before any work is started.

Submitted samples of each finish and color shall be prepared so that areas of each sample indicate the appearance of the various coats. For example, where a three coat system is specified, the sample shall be divided into three areas indicating one coat only, two coats and all three coats. The ENGINEER will provide written authorization constituting a standard, as to color and finish only, for each coating system.

The CONTRACTOR shall prepare a complete schedule of surfaces to be coated and shall identify the surface preparation and paint system he proposes to use. The schedule shall contain the name of the paint manufacturer, and the name, address and telephone number of the manufacturer's representative that will inspect the work. The schedule shall be submitted to the ENGINEER for review as soon as possible following the Notice to Proceed so that the schedule may be used to identify colors and to specify shop painting systems on order for fabricated equipment.

6. QUALITY ASSURANCE

The CONTRACTOR shall give the ENGINEER a minimum of three days advance notice of the start of any field surface preparation work of coating application work.

All such work shall be performed only in the presence of the ENGINEER, unless the ENGINEER has specifically allowed the performance of such work in his absence.

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Inspection by the ENGINEER, or the waiver of inspection of any particular portion of the work, shall not relieve the CONTRACTOR of his responsibility to perform the work in accordance with these Specifications.

Where protective coatings are to be performed by a subcontractor, said subcontractor must provide five references which show that the painting subcontractor has previous successful experience with the specified or comparable coating systems. Include the name, address, and the telephone number for the OWNER of each installation for which the painting subcontractor provided the protective coating.

PART 2 - PRODUCTS

MANUFACTURERS

- 5.4 All materials specified herein are manufactured by the TNEMEC Company, or approved equal. These products are specified to establish standards of quality and are approved for use on this project.
- 5.5 Equivalent materials of other manufacturers may be substituted on approval of the Engineer. Requests for substitution shall include Manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance and an independent laboratory certification that their product meets the performance criteria of the specified materials.
 - 5.5.1 Abrasion – Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load
 - 5.5.2 Adhesion – Elcometer Adhesion Tester
 - 5.5.3 Exterior Exposure – Exposed at 45 degrees facing the ocean (South Florida Marine Exposure)
 - 5.5.4 Hardness – ASTM D3363-74
 - 5.5.5 Humidity – ASTM D2247-68
 - 5.5.6 Salt Spray (Fog) – ASTM B117-73
- 5.6 Bidders desiring to use coatings other than those specified shall submit their proposal in writing to the Engineer at least ten (10) days prior to the bid opening. Substitutions which decrease the film thickness, the number of coats applied, change the generic type of coating, or fail to meet the performance criteria of the specified materials will not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.
- 5.7 All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 3.5 lbs/Gallon after thinning.
- 5.8 Colors, where not specified, shall be as selected by the Owner or their Representative.
- 5.9 All coatings in contact with potable water need to be NSF Certified in accordance with ANSI/NSF Standard 61.

PART 3 – EXECUTION

PAINT COATINGS

099610 - 4
CAM 16-1224
EXHIBIT 4
Page 433 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. INSPECTION OF SURFACES

- 3.1.1 Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the Engineer. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.
- 3.1.2 Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the Engineer.
- 3.1.3 When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the Engineer, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be adhered to.
- 3.1.4 Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "tooke" gauge is classified as a destructive test.

5. EQUIPMENT

- 5.1 Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practical from the compressor.
- 5.2 All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the paint manufacturer.
- 5.3 Contractor will provide free of charge to the Engineer a "Nordson-Mikrotest" or "Positest" dry film thickness gauge for ferrous metal and an OG232 "Tooke" gauge or equal for non-ferrous and cementitious surface, to be used to inspect coatings by the Engineer and Contractor. The gauges may be used by the Contractor and returned each day to the Engineer. Engineer will return gauges to Contractor at completion of job.

6. SURFACE PREPARATION

- 6.1.1 The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Steel Structures Painting Council's Surface Preparation Specification, unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

6.1.1.1 Standards for Surface Preparation**SSPC-SP1 Chemical and/or Solvent Cleaning****PAINT COATINGS**

099610 - 5
CAM 16-1224
EXHIBIT 4
Page 434 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter, and contaminants, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.

SSPC-SP2 Hand Tool Cleaning

Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by hand chipping, scraping, sanding, and wire brushing.

SSPC-SP3 Power Tool Cleaning

Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing, and grinding.

SSPC-SP4 Flame Cleaning

Dehydrating and removal of rust, loose mill scale, and some light mill scale by use of flame, followed by wire brushing.

SSPC-SP5 (NACE-1) White Metal Blast Cleaning

Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.

SSPC-SP6 (NACE-3) Commercial Grade Blast Cleaning

Complete removal of all dirt, rust scale, mill scale, foreign matter, and previous coatings, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.

SSPC-SP7 (NACE-4) Brush-Off Blast Cleaning

Removal of rust scale, loose mill scale, loose rust, and loose coatings, leaving tightly bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils, and solid contaminants. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bug holes, air pockets, and other subsurface irregularities, but so as not to expose underlying aggregate.

SSPC-SP8 Pickling

Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).

SSPC-SP10 (NACE-2) Near-White Blast Cleaning

Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale, and small specks of previous coating. At least 95% of each

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.

SSPC-SP11 Power Tool Cleaning to Bare Metal

Complete removal of rust, rust scale, mill scale, foreign matter, and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.

SSPC-SP12 (NACE-2) Surface Preparation By Water Jetting

Surface preparation of steel and other substrates by ultra-high pressure water jetting.

SSPC-SP13 (NACE-6) Surface Preparation of Concrete

Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

SSPC-SP14 (NACE-8) Industrial Blast Cleaning

Surface preparation standards for industrial blast cleaning allowing for traces of tightly adherent mill scale, rust, & coating residues on 10% of the surface.

SSPC-SP15 Commercial Grade Power Tool Cleaning

Commercial grade power tool cleaning a steel surface to produce a 1.0-mil surface profile. This method of cleaning falls between SP3 & SP11.

NAPF500-03-01 Surface Preparation for Ductile Iron Pipe

Standard surface preparation for the lining in ductile iron piping, fittings, and valves.

- 6.1.1.2 Visual standards – SSPC-VIS-1 (Swedish SIS OS 5900), "Pictorial Surface Preparation Standards for Painting Steel Surfaces," and the National Association of Corrosion Engineers, "Blasting Cleaning Visual Standards" TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.
- 6.1.1.3 Visual standards from International Concrete Repair Institute CSP1-9 for degree of roughness and surface profile of concrete.
- 6.1.2 Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to SSPC-SP1 Solvent Cleaning.
- 6.1.3 Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per SSPC-SP11-87T.
- 6.1.4 All weld seams, sharp protrusions, and edges shall be ground smooth prior to surface preparation or application of any coatings.

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- 6.1.5 All areas requiring field welding shall be masked off prior to shop coating, unless waived by the Engineer.
- 6.1.6 All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in SSPC-SP11-87T.
- 6.1.7 "Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the Engineer's attention; otherwise, Contractor assumes full responsibility.

7. PRETREATMENTS

- 7.1 When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

8. STORAGE

- 8.1 Materials shall be delivered to the job site in the original packages with seals unbroken and with legible un mutilated labels attached. Packages shall not be opened until they are inspected by the Engineer and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, and direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by him at the job site. Empty coating cans shall be required to be neatly stacked in an areas designated by the Engineer and removed from the job site on a schedule determined by the Engineer. Engineer may request a notarized statement from contractor detailing all materials used on the project.

10. PREPARATION OF MATERIALS

- 10.1 Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.
- 10.2 Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

11. APPLICATION

- 11.1.1 Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint manufacturer. Except as

PAINT COATINGS

099610 - 8
CAM 16-1224
EXHIBIT 4
Page 437 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

provided below, painting shall not be permitted when the atmospheric temperature is below 50° F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.

- 11.1.2 No coatings shall be applied unless surface temperature is a minimum of 5° above dew point; temperature must be maintained during curing.

11.1.2.1 DEW POINT CALCULATION CHART

DEW POINT CALCULATION CHART

Ambient Air Temperature – Fahrenheit

Relative Humidity	20	30	40	50	60	70	80	90	100	110	120
90%	18	28	37	47	57	67	77	87	97	107	117
85%	17	26	36	45	55	65	76	84	95	103	113
80%	16	25	34	44	54	63	73	82	93	102	110
75%	15	24	33	42	52	62	71	80	91	100	108
70%	13	22	31	40	50	60	68	78	88	96	105
65%	12	20	29	38	47	57	66	76	85	93	103
60%	11	29	27	36	45	55	64	73	83	92	101
55%	9	17	25	34	43	53	61	70	80	89	98
50%	6	15	23	31	40	50	59	67	77	86	94
45%	4	13	21	29	37	47	56	64	73	82	91
40%	1	11	18	26	35	43	52	61	69	78	87
35%	-2	8	16	23	31	40	48	57	65	74	83
30%	-6	4	13	20	28	36	44	52	61	69	77
SURFACE TEMPERATURE AT WHICH CONDENSATION OCCURS											

Dew Point

Temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5° above this point. Temperature must be maintained during curing.

Example

If air temperature is 70° F and relative humidity is 65%, the dew point is 57° F. No coating should be applied unless surface temperature is 62° F minimum.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- 11.1.3 No coatings shall be applied unless the relative humidity is below 85%.
- 11.1.4 Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.
- 11.1.5 Field Painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the Engineer.
- 11.1.6 Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.
- 11.1.7 The Contractor's scaffolding shall be erected, maintained, and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observations shall be cleaned immediately after paint application.
- 11.1.8 Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the Engineer.
- 11.1.9 The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint manufacturer.
- 11.1.10 Each coat of paint shall be recoated as per manufacturer's instructions. Paint shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.
- 11.1.11 Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.
- 11.1.12 Finish colors shall be in accordance with the COLOR SCHEDULE and shall be factory mixed (i.e., there shall be no tinting by the Contractor, unless authorized by the Engineer).
- 11.1.13 All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 1st coat prior to application of the full 1st coat.
- 11.1.14 All open seams in the roof area of tanks shall be filled after application of the Top coat with a flexible caulking such as Sika Flex 1A.

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

11.2 WORKMANSHIP

- 11.2.1 The Contractor must show proof that all employees associated with this project shall have been employed by the Contractor for a period not less than six (6) months.
- 11.2.2 Painting shall be performed by experienced painters in accordance with the recommendations of the paint manufacturer. All paint shall be uniformly applied without sags, runs, spots, or other blemishes. Work, which shows carelessness, lack of skill, or is defective in the opinion of the Engineer, shall be corrected at the expense of the Contractor.
- 11.2.3 The Contractor shall provide the names of at least 6 other projects of similar size and scope that they have successfully completed under their current company name.

11.3 PAINTING**11.3.1 BY BRUSH AND/OR ROLLERS**

- 11.3.1.1 Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenohl core shall be utilized.
- 11.3.1.2 The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.
- 11.3.1.3 Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.
- 11.3.1.4 It may require 2 coats to achieve the specified dry film thickness if application is by brush and roller.

11.3.2 AIR, AIRLESS, OR HOT SPRAY

- 11.3.2.1 The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
- 11.3.2.2 Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.
- 11.3.2.3 High build coatings should be applied by a crosshatch method of spray application to ensure proper film thickness of the coating.
- 11.3.2.4 Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.
- 11.3.2.5 Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

11.3.2.6 Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.

11.3.2.7 The first coat on concrete surfaces in immersion service should be sprayed and backrolled.

12. PROTECTION AND CLEAN-UP

12.1 It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting work.

12.2 At the option of the Engineer during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the Engineer, including but not limited to, full shrouding of the area.

12.3 If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.

12.4 At completion of the work, remove all paint where spilled, splashed, splattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted, and unpainted surfaces.

12.5 After completion of all painting, the Contractor shall remove from job site all painting equipment, surplus materials, and debris resulting from this work.

12.6 The Contractor is responsible for the removal and proper disposal of all hazardous materials from the jobsite in accordance with Local, State, and Federal requirements as outlined by the Environmental Protection Agency.

12.7 A notarized statement shall be presented to the Engineer that all hazardous materials have been disposed of properly including but not limited to: name of disposal company, disposal site, listing of hazardous materials, weights of all materials, cost per pound and EPA registration number.

12.8 The contractor is responsible for containing the structure from allowing any dust or flying aggregate to escape.

13. WORK IN CONFINED SPACES

The CONTRACTOR shall provide and maintain safe working conditions for all employees. Fresh air shall be supplied continuously to confined spaces through the combined use of existing openings, forced-draft fans, or by direct air supply to individual workers. Paint fumes shall be exhausted to the outside from the lowest level in the contained space.

PAINT COATINGS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Electrical fan motors shall be explosion proof if in contact with paint fumes. No smoking or open fires will be permitted in, or near, confined spaces where painting is being done.

14. TOUCH-UP MATERIALS

- 13.1 The Contractor shall provide at the end of the project at least one (1) gallon of each generic topcoat in each color as specified by the Engineer for future touch-up. Two gallons may be required for (2) component materials.

15. ON-SITE INSPECTION

- 14.1 During the course of this project the Engineer will reserve the option of incorporating the services of a qualified inspection service. The inspection service will be responsible for assuring the proper execution of this specification by the successful contractor.

16. COATING SYSTEM SCHEDULE

16.1 STEEL – STRUCTURAL, PIPES, AND EQUIPMENT

A. DUCTILE IRON PIPES, VALVES & FITTINGS (EXTERIOR SURFACES)

Surface Preparation: SHOP NAPF500-03-01

		DFT-Mils
<u>1st Coat:</u>	SHOP N140-1211	3.0 – 5.0
<u>2nd Coat:</u>	N69 High Build Epoxoline	3.0 – 5.0
<u>3rd Coat:</u>	N69 High Build Epoxoline	<u>3.0 – 5.0</u>
		9.0 – 15.0

B. DUCTILE IRON PIPES, VALVES & FITTINGS (INTERIOR LININGS)

Surface Preparation: SHOP NAPF500-03-01

		DFT-Mils
<u>Pipes:</u>	431 Polyamine Ceramic Epoxy	40.0
<u>Fittings:</u>	431 Polyamine Ceramic Epoxy	40.0
<u>Valves:</u>	431 Polyamine Ceramic Epoxy	40.0

NOTE: The lining shall be applied by an approved applicator with a successful history of applying ceramic epoxy linings to the interior of ductile iron piping, valves and fittings.

C. EXTERIOR EXPOSURE

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning or SSPC-SP3 Power Tool Clean. Surface must be clean and dry.

PAINT COATINGS

099610 - 13
CAM 16-1224
EXHIBIT 4
Page 442 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

	DFT-Mils
<u>1st Coat:</u> 1 Omnithane	2.5 – 3.5
<u>2nd Coat:</u> N69-Color Hi-Build Epoxoline II	2.0 – 3.0
<u>3rd Coat:</u> 1074U-Endura-Shield	<u>2.0 – 3.0</u>
	6.5 – 9.5

16.2 CONCRETE

A. EXTERIOR (ABOVE GRADE)

Surface Preparation: : Remove all chalk, dirt, dust, mold, mildew, curing compounds, form release oils, and other soluble contaminants by high pressure water blast cleaning (minimum 3500 PSI., 3 to 5 gallons per minute, potable water). A cleaning detergent such as Trisodium Phosphate may be utilized to facilitate cleaning. Surface must be clean and dry.

	DFT-Mils
<u>1st Coat:</u> 156-Color Enviro-Crete	4.0 – 6.0
<u>2nd Coat:</u> 156-Color Enviro-Crete	<u>4.0 – 6.0</u>
	8.0 – 12.0

B. INTERIOR (WALLS & CEILING)

Surface Preparation: Allow new concrete to cure for 28 day. SSPC-SP7 Sweep Abrasive Blast Clean to remove all loose parge coats and loose coatings and scarify sound remaining coatings. Surface must be clean and dry.

Resurfacer: Apply Tnemec Series 218 Epoxy Mortar to all voids and bug holes up to ½ inch deep. Apply Tnemec Series 217 Cementitious Mortar to all voids and bug holes over 1/2 inch deep.

	DFT-Mils
<u>1st Coat:</u> N69-Color Hi-Build Epoxoline II	4.0 – 6.0
<u>2nd Coat:</u> N69-Color Hi-Build Epoxoline II	<u>4.0 – 6.0</u>
	8.0 – 12.0

C. FLOORS & STEPS

Surface Preparation: Allow new concrete to cure for 28 days. Sweep Abrasive Blast or Mechanically Abrade surface to meet ICRI CSP-3. Surface must be clean and dry.

	DFT-Mils
<u>1st Coat:</u> 287-Color Enviro-Pox	2.0 – 4.0

PAINT COATINGS

099610 - 14
CAM 16-1224
EXHIBIT 4
Page 443 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Filler: Tnemec Series 215 as needed.

2nd Coat: 287-Color Enviro-Pox* 2.0 – 4.0

3rd Coat: 287-Color Enviro-Pox 2.0 – 4.0

4.0 – 8.0

NOTE: *For a non-skid finish, broadcast 30/50 dry silica sand 5 lbs per 150 sq/ft. of skid resistance sand into the second coat.

17. WARRANTY INSPECTION

17.1 A warranty inspection shall be conducted during the 11th month following completion coating and painting work. The contractor, painting subcontractor, and a representative of the coating material manufacturer shall attend this inspection with the Engineer.

17.2 All defective work shall be repaired in accordance with these specifications and to the satisfaction of the Engineer. The engineer may, by written notice to the contractor, reschedule the warranty inspection to another date within the 1-year correction period or may cancel the warranty inspection altogether. If a warranty inspection is not held, the contractor is not relieved of his responsibilities under the Contract Documents.

18. GENERAL STATEMENT

18.1 Manufacturer's Technical Data Sheets, Installation Instructions and Label Directions are considered to be part of this specification.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 11305
SUBMERSIBLE PUMPS****PART 1 GENERAL****1.1 WORK INCLUDED**

- A. This Section includes the Work necessary to furnish and install, complete, the submersible pumps specified herein.
- B. Furnish a complete installation, including pumps, accessories, and field panel with controls as part of the pump system package. Instrumentation and controls shall be in conformance with Division 16, ELECTRICAL requirements and Section 16960, LIFT STATION CONTROL CABINET.

1.2 REFERENCES

- A. The following is a list of Standards that may be referenced in this Section:
 - 1. American Society for Testing and Materials (ASTM):
 - a. A48, Standard Specification for Gray Iron Castings.
 - b. A576, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
 - 2. Hydraulic Institute Standards (HIS).
 - 3. National Electric Code (NEC).
 - 4. National Electrical Manufacturers Association (NEMA).
 - 5. National Fire Protection Association (NFPA): 70, National Electric Code.
 - 6. Underwriters Laboratories (UL).

1.3 DEFINITIONS

- A. Terminology pertaining to pumping unit performance and construction shall conform to ratings and nomenclature of Hydraulic Institute Standards.
- B. Total Head: Total head in feet of liquid pumped shall be the discharge head minus the suction head (or plus the suction lift), both measured at the pump flanges and corrected to the pump shaft centerline, plus the differences in velocity head at the same points.
- C. Hydraulic Efficiency: Hydraulic efficiency shall be the ratio of the useful output power of the pump to the input power of the pump.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Make, model, weight, and horsepower of each equipment assembly.

SUBMERSIBLE PUMPS

CAM 1305224
11305-1
EXHIBIT 4
Page 445 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
3. Performance data curves showing head, capacity, horsepower demand, and pump efficiency over entire operating range of pump, from shutoff to maximum capacity. Indicate separately head, capacity, horsepower demand, overall efficiency, and minimum submergence required at guarantee point.
4. Power and control wiring diagrams, including terminals and numbers. Include a functional description of internal and external instrumentation and controls to be supplied and a list of parameters monitored, controlled or alarmed.
5. Description and rating of motor thermal and moisture sensing and protection systems.
6. Detailed Mechanical Drawings showing equipment fabrications and interface with other work. Include dimensions and weights.
7. Complete motor nameplate data, as defined by NEMA, from motor manufacturer.
8. Factory finish system.
9. Bearing life calculations.

B. Quality Control Submittals:

1. Factory Performance Test Reports.
2. Manufacturer's Certification of Compliance that factory finish system meets requirements specified herein.
3. Special shipping, storage and protection, and handling instructions.
4. Manufacturer's printed installation instructions.
5. Manufacturer's Certificate of Proper Installation in accordance with Section 01640, MANUFACTURER'S SERVICES
6. Suggested spare parts list to maintain equipment in service for period of 1 to 5 years. Include list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
7. List special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
8. Operation and Maintenance Manual.

1.5 EXTRA MATERIALS

A. Furnish for Each Pump:

1. One set mechanical seals for each pump.
2. One additional impeller for each pump.

PART 2 PRODUCTS

2.1 GENERAL

- A. Pump and Electrical Driver: Meet requirements for class, group, and division location in accordance with NFPA 70. The pump station installation shall

SUBMERSIBLE PUMPS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

meet all the requirements for a Class I, Division 2, gases and vapors (Group D) location as described in the NEC and NFPA 824. Motors shall be listed and labeled for use in the location specified by UL, CSA, or FM.

- B. Pump cables shall be sized according to NEC standards. The cable and entry into the pump shall be approved for use in NEC Class 1, Division 1, Groups C and D hazardous locations.
- C. All cables shall be continuous, without splices from the motor to the control panel.

2.2 SUPPLEMENTS

- A. Specific requirements are attached to this Section as supplements.
- B. Pumps shall be as specified in the supplements to this Section as supplied by Flygt, Davis/EMU, Homa, or Ebara.

2.3 COMPONENTS

- A. Pump equipment shall consist of pump(s) complete with motor(s), internal sensors, control system, guide rail and anchoring brackets, base elbow, power cable(s), and pump lifting chain.
 - 1. Pump metal parts that come into contact with guide rail or cable system shall be made of nonsparking materials.
 - 2. Pump shall be a center discharge style.
 - 3. Wet or dry pit models depending on the application(s) shown on the Drawings. Pumps shall be provided with motor cooling provisions suitable for intended application.
 - 4. Control panel and level switches as specified in Section 16960, LIFT STATION CONTROL CABINET.
- B. Lifting Arrangement: Type 316 stainless steel chain, and one "grip-eye" with Type 316 stainless steel cable for each station. Attach chain permanently to pump and access platform with stainless steel wire rope. "Grip-eye" will be capable of being threaded over and engaging links of stainless steel chain so pump and motor may be lifted with "grip-eye" and independent hoist.
- C. Motor:
 - 1. Motor nameplate horsepower shall not be exceeded at any head capacity point on pump curve.
 - 2. Pump motor and sensor cables shall be suitable for submersible pump application and cable sizing shall conform to NEC specifications for pump motors. Cable shall be of sufficient length to reach terminal junction without strain or splicing.
 - 3. The motor shall be designed, manufactured, and tested in accordance with NEMA MG1 and shall be selected to provide the operation specified for this equipment.

SUBMERSIBLE PUMPS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

a. At 100 Percent Load:

Horsepower	Guaranteed Minimum Efficiency	Guaranteed Minimum Power Factor
Under 5	72	82
5 thru 10	80	82
10.1 thru 50	85	82
50.1 thru 100	87	82
Over 100	89	82

4. Insulation System: Manufacturer's standard Class B or Class F.
5. Motor capable of running dry continuously.
6. Enclosure:
 - a. Hermetically sealed, watertight, for continuous submergence up to 65-foot depth.
 - b. Listed to meet UL 674, or equal, FM certification, and NFPA 70 requirements for Class 1, Division 2, Group D hazardous atmosphere.
 - c. Seals: Tandem mechanical.
7. Bearing and Lubrication:
 - a. Permanently sealed and lubricated, replaceable antifriction guide and thrust bearings.
 - b. Minimum 15,000 hours L-10 bearing life.
8. Inrush kVA/horsepower no greater than NEMA MG 1 and NFPA 70, Code F.
9. Winding Thermal Protection:
 - a. Thermal sensor and switch assembly, one each phase, embedded in stator windings and wired in series.
 - b. Switches normally closed, open upon excessive winding temperature, and automatically reclose when temperature has cooled to safe operating level.
 - c. Switch contacts rated at 5 amps, 120 volts ac.
10. Motor Seal Failure Moisture Detection:
 - a. Probes or sensors to detect moisture beyond seals.
 - b. Probe or sensor monitoring module for mounting in motor controller, suitable for operation from 120-volt ac supply.
 - c. Monitoring module with control power transformer, probe test switch and test light, and two independent 120-volt ac contacts, one opening and one closing when the flux of moisture is detected.
11. Winding thermal protection, moisture detection, and bearing overtemperature specified above may be monitored by a single device providing two independent 120-volt ac contacts, one closing and one opening on malfunction.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

12. Connecting Cables:
 - a. One cable containing power, control, and grounding conductors.
 - b. Each cable suitable for hard service, submersible duty with watertight seal where cable enters motor.
 - c. Length: 50 feet minimum, or longer as required to prevent splices.
 - d. UL 1 listed and sized in accordance with NFPA 70.
13. Motor Service Factor = 1.15.

2.4 CONTROL PANEL

- A. Provide package control system, instrumentation, control system and accessories as specified in Section 16960, LIFT STATION CONTROL CABINET. This Section contains information, submittal requirements and mandatory requirements for the package control system to be furnished with the equipment specified in this Section.

2.5 ACCESSORIES

- A. Level Control:
 1. Provide Level Switch for:
 - a. LOW Level: Pumps OFF/ALARM.
 - b. Level Switch C: Pumps OFF
 - c. Level Switch B: Lead pump ON.
 - d. Level Switch A: Lag pump ON.
 - e. HIGH Level: Alarm/All Pumps ON.
 2. In accordance with Section 16960, LIFT STATION CONTROL CABINET.
- B. Equipment Identification Plate: 16-gauge stainless steel with 1/4-inch die-stamped equipment tag number securely mounted in readily visible location.
- C. Guide Rails: Sliding guide bracket shall be integral part of pump unit. Pump unit shall be guided by no less than 2 CP guide rails and pressed tightly against discharge connection elbow with metal-to-metal contact or through use of profile-type gasket, provided that gasket is attached to pump's flange and can be easily accessed for inspection when pump is lifted out of wet well.
 1. Upper guide bracket shall be Type 316 stainless steel.
 2. Guide rail assemblies shall be complete with all supports and anchor brackets necessary to provide a properly functioning installation based on the sump geometry and dimensions provided on the Drawings.
 3. Guide rail assemblies and all support brackets shall be Type 304 stainless steel
 4. Intermediate guide rail supports shall be used for rails over 20 feet long.
 5. Install with tapered or rubber grommets fittings to reduce vibration.

SUBMERSIBLE PUMPS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- D. Provide Type 316 stainless steel cable rack for cables and floats.
- E. Provide Type 316 stainless steel lifting bail for each pump.
- F. Lifting Lugs: Equipment weighing over 100 pounds.
- G. Anchor Bolts: All anchor bolts required for equipment and accessories shall be provided as specified in Section 05500, METAL FABRICATIONS AND CASTINGS.
 - 1. Pump base anchor bolts shall be "J" type bolts, minimum 3/4-inch with 2 inches minimum projection. Pump base bolts shall be cast-in-place.
 - 2. CONTRACTOR will be responsible for improperly installed anchor systems within the warranty period for the Project, including but not limited to concrete failure, poor workmanship, and fastener failure.
- H. Access Covers and Doors: In accordance with the provisions of Section 05500, METAL FABRICATIONS AND CASTINGS.
- I. Pressure Gauge:
 - 1. General:
 - a. Function: Pressure indication.
 - b. Bourdon tube actuated for ranges 10 psig and above.
 - 2. Performance:
 - a. Range: 0 to 100 feet or as noted. Compound scale when noted.
 - b. Accuracy: Plus or minus 0.5 percent of span.
 - 3. Features:
 - a. Mounting: Lower stem, unless otherwise noted.
 - b. Dial: 4-1/2-inch diameter, unless otherwise noted.
 - c. Case Material: Phenolic plastic, unless otherwise noted.
 - d. Element Material: Phosphor-bronze, unless otherwise noted.
 - e. Dampening: Pulsation dampener when noted, piston type with multiple choice of piston placement to vary the desired amount of dampening.
 - f. Case Type: Solid front design with solid wall between window and element. Rear of case, gasketed pressure relief.
 - g. Pointer: Micrometer pointer with self-locking adjustment.
 - h. Movement: Stainless steel, rotary geared.
 - i. Liquid Filled Face: If noted.
 - 4. Process Connection:
 - a. Line Size: 1/2 inch.
 - b. Connection Type: Threaded.
 - 5. Manufacturers:
 - a. Ashcroft Duragauge, Model No. 1279/1379.
 - b. Robert Shaw Acragage.
 - c. Marsh Mastergauge.
 - d. WIKA Type 21X.34.
- J. Pressure Seal, Diaphragm:

SUBMERSIBLE PUMPS

CA 1305226
 1130526
 EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. General:
 - a. Function: Isolate sensing element from process fluid.
 - b. Type: Fluid filled, corrosion-resistant.
2. Service:
 - a. Pressure: Same as associated sensor.
 - b. Temperature: As noted.
3. Features:
 - a. Materials:
 - 1) Lower Housing: Type 316 stainless steel, unless otherwise noted.
 - 2) Diaphragm Material: Type 316 stainless steel, unless otherwise noted.
 - b. Bleed screw in upper housing.
 - c. Fill Fluid: As noted. Factory filled and assembled when possible.
4. Process Connections:
 - a. Instrument: 1/2-inch female NPT, unless otherwise noted.
 - b. Process: 1/2-inch female NPT, unless otherwise noted.
 - c. Connection Material: As noted.
5. Manufacturers:
 - a. Ametek, Mansfield and Green Division, Type SG.
 - b. Ashcroft, Type 101.

2.6 FACTORY FINISHING

- A. Pump equipment and accessories shall be factory prepared, primed, and painted with a coal-tar epoxy system, applied in two 16 MDFT coats. Coating shall be amine or phenolic epoxy type; 70 percent volume solids minimum, suitable for immersion service.
- B. Manufacturer's standard baked enamel finish.

2.7 SOURCE QUALITY CONTROL

- A. Factory Inspections: Inspect control panels for required construction, electrical connection, and intended function.
- B. The rotating parts of each pump and driving unit shall be dynamically balanced before final assembly. The driving unit alone shall operate without vibration in excess of the limits stated in the latest revision of NEMA MG 1.
- C. Factory Tests and Adjustments: Test all equipment and control panels actually furnished.
- D. Factory Test Report: Include test data sheets, curve test results, performance test logs.
- E. Functional Test: Perform manufacturer's standard.

SUBMERSIBLE PUMPS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

F. Performance Test:

1. Conduct on each pump.
2. Perform under actual or approved simulated operating conditions.
3. Test for a continuous 3-hour period without malfunction.
4. Test Log: Record the following:
 - a. Total head.
 - b. Capacity.
 - c. Horsepower requirements.
 - d. Driving motor voltage and amperage measured for each phase.
 - e. Throttle discharge valve to obtain pump data points on curve at 2/3, 1/3, and shutoff conditions.

G. Test cables and conductors in accordance with Section 16950, ELECTRICAL TESTING.

2.8 CONTROL PANEL

- A. The pump motor control panel and all related components shall be the responsibility of the pump Supplier. Provide a complete control panel and components as shown on the Electrical Drawings and as specified in Division 16, ELECTRICAL. The panel shall be manufactured with all the specified components, no exceptions. This Section shall have complete responsibility for the supply, manufacturing, coordination with electrical and RTU contractors, and all test and startup as specified elsewhere in these Contract Documents.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. Connect suction and discharge piping without imposing strain to pump flanges.
- C. No portion of pump shall bear directly on floor of sump.

3.2 FIELD QUALITY CONTROL

- A. Functional Test: Conduct on each pump.
1. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
 2. Flow output.
 3. Test for continuous 3-hour period.
 4. Test Report Requirements: In accordance with Hydraulic Institute Standards for centrifugal pump tests HIS 1.6.

SUBMERSIBLE PUMPS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.3 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative: Present at site or classroom designated by OWNER, for minimum person-days listed below, travel time excluded:
1. 1/2 person-day for installation assistance and post startup training per pump station.
 2. 1/2 person-day for performance testing and completion of Manufacturer's Certificate of Proper Installation.
- B. See Section 01640, MANUFACTURERS' SERVICES.

3.4 SUPPLEMENTS

- A. The supplements listed below, following "END OF SECTION," are part of this Specification.
1. Data Sheets: Pump and motor.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SUBMERSIBLE PUMP DATA SHEET, 11305-_____Tag Numbers: N/APump Name: Pump Station D-12Manufacturer and Model Number: (1) Flygt NT 3202 HT 3 4-60**SERVICE CONDITIONS**Liquid Pumped (Material and Percent): domestic wastewaterPumping Temperature (Fahrenheit): Normal: 75 Max 80 Min 70Abrasive (Y/N) Y Possible Scale Buildup (Y/N): N**PERFORMANCE REQUIREMENTS**

Minimum Shutoff Head (ft): _____

Capacity (US gpm): Rated: 1312 Secondary: _____.Total Dynamic Head (Ft): Rated: 90 Secondary: _____.

Min. Rated Pump Hydraulic Efficiency at Rated Capacity (%): _____

Max. Pump Speed at Rated Capacity (rpm): _____ Constant (Y/N): NAdjustable (Y/N): N**DESIGN AND MATERIALS**Pump Type: Heavy-Duty Non-Clog (Y/N) Y Other: _____Volute Material: Grey Cast Iron ASTM A48Pump Casing Material: Cast Iron ASTM A48Motor Housing Material: Cast Iron ASTM A48 (Class 35B)Wear Rings/Plate Case (Y/N) Y Material: Nitrile RubberWear Ring Impeller (Y/N): N Material: _____

SUPPLEMENTAL SUBMERSIBLE PUMPS

11305-S1
CAM 16-1224
EXHIBIT 4
Page 454 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

SUBMERSIBLE PUMP DATA SHEET, 11305- _____**Tag Numbers:** N/A**Pump Name:** Pump Station D-12Elastomers: Nitrile RubberFasteners: Stainless Steel 304Impeller: Type: Non-Clog (Y/N): Y Other: _____
Material: Cast Iron ASTM A48Shaft Material: Carbon Steel, ASTM A576 with stainless steel sleeve or all stainless steel.Base Elbow: Grey Cast Iron ASTM A48Double Mechanical Seal (Y/N): Y Bearing Life (Hrs): 50,000**DRIVE MOTOR** (See Section 16405, AC INDUCTION MOTORS)Horsepower: 60 Voltage: 480 Phase: 3 Synchronous Speed (rpm): 1775Enclosure: EXP YCLASSIFICATION: Class 1, Group D, Division 2

For Adjustable Speed Drive Range: _____ min to _____ max, See Section 16485, ADJUSTABLE FREQUENCY DRIVE SYSTEMS.

Other Features: _____

Moisture Detection Switches (Y/N): YThermal Protection Embedded in Windings (Y/N): Y**REMARKS** __________

SUPPLEMENTAL SUBMERSIBLE PUMPS

11305-S2
CAM 16-1224
EXHIBIT 4
Page 455 of 663

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 15100
VALVES AND OPERATORS****PART 1 GENERAL****1.01 SUBMITTALS****A. Shop Drawings:**

1. Product data sheets for make and model.
2. Complete catalog information, descriptive literature, Specifications, and identification of materials of construction.

PART 2 PRODUCTS**2.01 GENERAL**

- A. Valve to include operator, actuator, handwheel, chain wheel, extension stem, floor stand, worm and gear operator, operating nut, chain, wrench, and accessories as appropriate and as shown on the Drawings for a complete operation.
- B. Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- C. Valve same size as adjoining pipe.
- D. Valve ends to suit adjacent piping.
- E. Size operator to operate valve for the full range of pressures and velocities.
- F. Valve to open by turning counterclockwise.
- G. Factory mount operator, actuator, and accessories.

2.02 MATERIALS

- A. Brass and bronze valve components and accessories that have surfaces in contact with water to be alloys containing less than 16 percent zinc and 2 percent aluminum.
- B. Approved Alloys Are of the Following ASTM Designations:
 1. B61, B62, B98 (Alloy UNS No. C65100, C65500, or C66100), B139 (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164, B194, and B127.
 2. Stainless steel Alloy 18-8 may be substituted for bronze.

2.03 FACTORY FINISHING

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. Epoxy Lining and Coating: In accordance with manufacturer's instructions for on-site soil and groundwater conditions and Section 02502, Ductile Iron Pipe and Fittings.
- B. Exposed Valves:
 - 1. In accordance with manufacturer's instructions for onsite soil and groundwater conditions.
 - 2. Safety isolation valves and lockout valves with handles, handwheels, or chain wheels "safety yellow."

2.04 VALVES

- A. Gate Valves:
 - 1. All valves, unless otherwise specified, shall be the product of one manufacturer.
 - 2. Gate valves shall be resilient seat gate valves for 150 psi minimum working pressure, conforming to AWWA C515 or C509.
 - a. The gate valves shall have a high strength, bronze, nonrising stem.
 - b. Valves shall have neoprene, Buna-N or equal, but not natural rubber, O-ring stem seals and be of a design that allows replacement of the O-rings while the valve is in service under pressure.
 - c. Operating nuts shall be AWWA 2-inch square with skirts and open by turning the nut counter clockwise.
 - d. Valve body, bonnet, and gate shall be ductile iron conforming to ASTM A536. Shell thickness of body and bonnet components shall conform to Table 2, Section 4.4 of AWWA C509 or C515.
 - 3. Valve body and bonnet shall be coated on all interior and exterior surfaces with a two-part epoxy conforming to the requirements of AWWA C550. Coating shall be suitable for potable water service.
 - 4. Gates shall be covered with rubber over all interior and exterior ferrous surfaces. Rubber shall be securely bonded to the gate body including the part that houses the stem nut.
 - 5. Direct-buried gate valves shall be polyethylene encased and shall have Type 304 stainless steel bonnet bolts.
 - 6. Gate valves shall be as manufactured by American Flow Control Series 2500, Mueller Series 2360 and 2361; or Clow/Kennedy.
 - 7. Tapping valves shall conform to these Specifications. Tapping sleeves shall be in accordance with the provisions of Section 02500, Conveyance Piping – General. Tapping valves shall be mounted in a horizontal position. Tapping valves shall be compatible with the tapping sleeve – no field grinding will be permitted.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B. Ball Valves:

1. Ball Valve 2 Inches and Smaller for General Water and Air Service: All-bronze, three-piece body type, screwed ends, full bore ports, Teflon seat, blowout-proof stem, hand lever operator, rated 150 psi SWP, 400-pound WOG minimum.
 - a. Manufacturers and Products:
 - 1) Nibco, Inc.; T-595-Y.
 - 2) Grinnell Supply Sales Co.; Figure 3810.

C. Plug Valves:

1. All valves, unless otherwise specified, shall be the product of one manufacturer.
2. Eccentric Valve 3 Inches through 12 Inches:
 - a. Nonlubricated type rated 175 psig CWP.
 - b. Drip-tight shutoff with pressure from either direction. Valves will be rejected if they are delivered to the site with no indication that they meet this requirement.
 - c. Cast iron body with flanged ends or grooved ends in accordance with AWWA C606 for rigid joints, mechanical joint ends for buried valve.
 - d. Plug shall be cast iron with round or rectangular port or no less than 80 percent of the connecting pipe area and coated with Buna-N or Hycar.
 - e. Seats shall be welded nickel.
 - f. Stem bearing shall be self-lubricating stainless steel, bronze or reinforced Teflon.
 - g. Stem seal shall consist of multiple V-rings, U-cups, or O-rings of nitrile rubber with grit seals on stem.
 - h. For buried service, provide external epoxy coating.
 - i. For wastewater service, valves shall be lined with a two-part epoxy in accordance with AWWA C550.
 - j. Valve 3 through 4 inches with wrench lever manual operator.
 - k. Valve 6 through 12 inches with totally enclosed, geared, manual operator with handwheel, 2-inch nut, or chain wheel.
 - 1) Size operator for 1.5 times the maximum operating shutoff pressure differential for direct or reverse pressure, whichever is greater.
 - 2) For buried service, provide completely sealed operator filled with heavy lubricant.
 - l. Manufacturer and Products: DeZurik; Series PEC, Clow, or Val-matic Camcentric.
3. Eccentric Valve 14 Inches through 20 Inches:
 - a. Nonlubricated type rated 150 psig CWP.
 - b. Driptight shutoff with pressure from either direction. Valves will be rejected if they are delivered to the site with no indication that they meet this requirement.
 - c. Cast iron body with flanged ends or grooved ends in accordance with AWWA C606 for rigid joints, mechanical joint ends for buried valve.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- d. Plug shall be cast iron with round or rectangular port or no less than 80 percent of the connecting pipe area and coated with Buna-N or Hycar.
 - e. Seats shall be welded nickel.
 - f. Stem bearing shall be self-lubricating stainless steel, bronze, or reinforced Teflon.
 - g. Stem seal shall consist of multiple V-rings, U-cups, or O-rings of nitrile rubber with grit seals on stem.
 - h. For buried service, provide external epoxy coating.
 - i. For wastewater service, valves shall be lined with a two-part epoxy in accordance with AWWA C550.
 - j. Totally enclosed, geared, manual operator with handwheel, 2-inch nut, or chain wheel.
 - 1) Size operator for 1.5 times the maximum operating shutoff pressure differential for direct or reverse pressure, whichever is greater.
 - 2) For buried service, provide completely sealed operator filled with heavy lubricant.
 - k. Manufacturer and Products: DeZurik; Series PEC, Clow, or Val-matic Camcentric.
4. Eccentric Valve 24 Inches through 48 Inches:
- a. Nonlubricated type rated 150 psig CWP.
 - b. Driptight shutoff with pressure from either direction. Valves will be rejected if they are delivered to the site with no indication that they meet this requirement.
 - c. Cast iron body with flanged ends or grooved ends in accordance with AWWA C606 for rigid joints, mechanical joint ends for buried valve.
 - d. Plug shall be cast iron with round or rectangular port or no less than 80 percent of the connecting pipe area and coated with Buna-N or Hycar.
 - e. Seats shall be welded nickel.
 - f. Stem bearing shall be self-lubricating stainless steel, bronze or reinforced Teflon.
 - g. Stem seal shall consist of multiple V-rings, U-cups, or O-rings of nitrile rubber with grit seals on stem.
 - h. For buried service, provide external epoxy coating.
 - i. For wastewater service, valves shall be lined with a two-part epoxy in accordance with AWWA C550.
 - j. Totally enclosed, geared, manual operator with handwheel, 2-inch nut, or chain wheel.
 - 1) Size operator for 1.5 times the maximum operating shutoff pressure differential for direct or reverse pressure, whichever is greater.
 - 2) For buried service, provide completely sealed operator filled with heavy lubricant.
 - k. Manufacturer and Products: DeZurik; Series PEC, Pratt Ballmatic, Clow, or Val-matic Camcentric.

VALVES AND OPERATORS

CA 15160324
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

D. Butterfly Valves:

1. General:

- a. All valves, unless otherwise specified, shall be the product of one manufacturer.
- b. Valves shall meet the requirements or AWWA C504 except as modified herein.
- c. Valves shall be Class 150B.
- d. Valves shall be flanged, short-body design for exposed service and mechanical joint design for buried service with joints as described in Section 02500, Conveyance Piping - General.
- e. Actual port diameter shall not be less than 1 inch smaller than the nominal pipe size.
- f. Valves shall be equipped with an adjustable, mechanical limiting device in the operator to prevent over travel of the disc in the open and closed position. Disc position stops in the valve body are not permitted.
- g. Valves shall be lined with a two-part epoxy in accordance with AWWA C550. Coating shall be suitable for potable water service.

2. Valve bodies shall be constructed of ASTM B126 Class B cast iron and shall have two integrally cast trunnions for shaft bearings.

3. Valve Seats:

- a. Shall be field adjustable around the full circumference of the body without interruption of flow for all valves 24 inches and larger.
- b. For valves in buried service, seats shall be incorporated into the valve body. For above grade service, seats may be incorporated into the valve body or valve disc.
- c. Seats shall be replaceable without dismantling the operator, disc or shaft and without removing the valve from the line.
- d. Valve seats shall be Buna-N unless otherwise specified.
- e. Seats bond shall be tested at 75 pounds in accordance with ASTM D429, Method B for valves 20 inches and smaller. For valves larger than 20 inches, seats shall be retained in the body by mechanical means without retaining rings, segments, screws or hardware of any kind protruding into the flow stream.

4. Bearings:

- a. Valve bearings shall be the sleeve type.
 - 1) 100 percent nylon or Teflon for valves 20 inches and smaller.
 - 2) Bearings shall be Teflon with fiberglass backing for valves 24 inches and larger.
- b. Bearings shall be self-lubricating and bearing load shall not exceed 1/5 of the compressive strength of the bearing or shaft material.

5. Valve Discs:

- a. Discs shall operate through a 90-degree angle from fully closed to fully open.
- b. Valve discs shall be cast iron alloy ASTM A436 Type 1, ASTM A48 or ASTM A126 for valves 20 inches and smaller and ASTM A48 cast iron or ASTM A536 ductile iron for valves 24 inches and larger.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- c. Valve discs shall have a Type 316 stainless steel seating edge and shall not have any hollow chambers.
 - 6. Shafts and Seals:
 - a. Valve shafts shall be Type 316 stainless steel meeting the minimum requirements of AWWA C504.
 - b. Valve shafts shall be one piece for valves 20 inches and smaller and two piece for valves 24 inches and larger.
 - c. Shaft seals shall be self-compensating, split V type and shall be adjustable and replaceable without removing the operator and/or the shaft, except for buried applications.
 - d. Shaft seals shall be Buna-N unless otherwise specified.
 - 7. Valves for buried service shall be totally enclosed, fully gasketed, grease packed and designed to operate indefinitely when submerged under a minimum 20 feet of water.
 - 8. Manufacturers: Valmatic – American BFV, Mueller Linesal III, Pratt - Groundhog, or Dezurik – BAW.
- E. Check Valves:
 - 1. Swing Check Valve 2-1/2 Inches through 12 Inches: Flanged end, cast iron body, bronze mounted swing type, solid bronze hinges, stainless steel hinge shaft, outside lever and spring, rated 125-pound SWP, 200-pound WOG. Check valves shall meet requirements of AWWA C508.
 - a. Manufacturers and Products:
 - 1) GA Series 250 Swing Check
 - 2) Milliken Swing Check.
 - 3) American Flow Control Series 50SC or 600
 - b. Valves shall be lined with a two-part epoxy in accordance with AWWA C550.
 - 2. Resilient Seat Check Valve 2-1/2 Inches through 16 Inches: Flanged end, cast iron body and bonnet, rubber-encapsulated, DI or steel disc, rated 125-pound SWP, 200 pound WOG. Check valves shall meet requirements of AWWA C508.
 - a. Manufacturers and Products:
 - 1) American Flow Control Series 2100.
 - 2) Milliken Flex Check.
 - 3) Val-Matic Swingflex.
 - b. Valves shall be lined with a two-part epoxy in accordance with AWWA C550
 - 3. Type V642 Reduced Pressure Backflow Preventer: Two check valves, independent relief between the valves; testing cock, in accordance with AWWA C511, rated 175-pound CWP, meets requirements of USC Cross Connection Control Laboratory.
 - a. Manufacturers and Products:
 - 1) FEBCO; Model 825Y, 825YD.
 - 2) Hersey; Model FRP II, 6CM.
- F. Self-Contained Automatic Valves:
 - 1. Sewage Air and Vacuum Release Valve:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Combination valve, suitable for sewer service, automatically provides air release during normal operation, exhausts air during the filling of a system and allows air to re-enter during draining or when vacuum occurs.
 - b. Rated 150 psi working pressure and built with a special short body, and have cast iron, ductile iron, or semi-steel body, covers with stainless steel float and trim.
 - c. Sewage air and vacuum valve to be fitted with blowoff valve, quick disconnect couplings, and a minimum 6 feet of hose to permit backflushing after installation without dismantling valve.
 - d. Provide with service saddle on main and ball corporation stop (Ford FB500 style; or equal).
 - e. Size as shown on the Drawings or 2 inches minimum.
 - f. Manufacturers and Products:
 - 1) International Valve Marketing, Inc., (Vent-O-Mat - Series RGX).
 - 2) APCO Valve and Primer Corp – 440 Series; or equal.
 - 3) Val-Matic Series 301A-308.
2. Water Combination Air and Vacuum Release Valve:
- a. Single body, combination valve suitable for water service, automatically provides air release during normal operation, exhausts air during the filling of a system and allows air to re-enter during draining or when vacuum occurs.
 - b. Rated 150 psi working pressure and built with a special short body, and have cast iron, ductile iron, or semi-steel body, covers with stainless steel float and trim.
 - c. Provide with service saddle on main and ball corporation stop (Ford FB500 style; or equal).
 - d. Size as shown on the Drawings, or 2 inches minimum.
 - e. Manufacturers and Products:
 - 1) International Valve Marketing, Inc., (Vent-O-Mat - Series RBX).
 - 2) APCO Valve and Primer Corp. - 140C Series; or equal.
 - 3) Val-Matic Series 200.

2.05 OPERATORS

A. Manual Operator:

1. General:
 - a. Operator force not to exceed 40 pounds under any operating condition, including initial breakaway. Gear reduction operator when force exceeds 40 pounds.
 - b. Operator self-locking type or equipped with self-locking device.
 - c. Position indicator on quarter-turn valves.
 - d. Worm and gear operators one-piece design worm-gears of gear bronze material. Worm hardened alloy steel with thread ground and polished. Traveling nut type operators threader steel reach rods with internally threaded bronze or ductile iron nut.
2. Exposed Operator:
 - a. Galvanized and painted handwheels.

VALVES AND OPERATORS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. Lever operators allowed on quarter-turn valves 8 inches and smaller.
- c. Cranks on gear type operators.
- d. Valve handles to take a padlock, and wheels a chain and padlock.
- 3. Buried Operator:
 - a. Buried service operators on valves larger than 2-1/2 inches shall have a 2-inch AWWA operating nut. Buried operators on valves 2 inches and smaller shall have cross handle for operation by forked key. Enclose moving parts of valve and operator in housing to prevent contact with the soil.
 - b. Design buried service operators for quarter-turn valves to withstand 450 foot-pounds of input torque at the FULLY OPEN or FULLY CLOSED positions, grease packed and gasketed to withstand a submersion in water to 10 psi.
 - c. Buried valves shall have extension stems, bonnets, and valve boxes.

2.06 ACCESSORIES

- A. Cast Iron Valve Box: Designed for traffic loads, sliding type, with minimum of 6-inch ID shaft.
 - 1. Box: Cast iron with minimum depth of 9 inches.
 - 2. Lid: Cast iron.
 - a. Minimum depth 3 inches.
 - b. Marked SEWER or WATER, as appropriate.
 - c. Turn to retain with locking bolt.
 - 3. Extensions: cast iron.
 - a. O-ring seal between sections.
 - b. Self-centering alignment ring.
 - 4. American Flow Control Trench Adaptor or equal.
- B. Provide service saddles and fittings in accordance with Section 02518, Water Connections, for ARV's.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Flange Ends:
 - 1. Flanged valve boltholes shall straddle vertical centerline of pipe.
 - 2. Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.
- B. Screwed Ends:
 - 1. Clean threads by wire brushing or swabbing.
 - 2. Apply joint compound.

VALVES AND OPERATORS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

C. Valve Orientation:

1. Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above finished floor, unless otherwise shown.
 2. Install operating stem horizontal in horizontal runs of pipe having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above finish floor, unless otherwise shown.
 3. Orient butterfly valve shaft so that unbalanced flows or eddies are equally divided to each half of the disc, i.e., shaft is in the plane of rotation of the eddy.
 4. If no plug valve seat position is shown, locate as follows:
 - a. Horizontal Flow: The flow shall produce an "unseating" pressure, and the plug shall open into the top half of valve.
 - b. Vertical Flow: Install seat in the highest portion of the valve.
- D. Install a line size ball valve and union upstream of each solenoid valve, in-line flow switch, or other in-line electrical device, excluding magnetic flowmeters, for isolation during maintenance.
- E. Locate valve to provide accessibility for control and maintenance. Install access doors in finished walls and plaster ceilings for valve access.
- F. Extension Stem for Operator: Where the depth of the valve is such that its centerline is more than 3 feet below grade, furnish an operating extension stem with 2-inch operating nut to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover.
- G. Torque Tube: Where operator for quarter-turn valve is located on floor stand, furnish extension stem torque tube of a type properly sized for maximum torque capacity of the valve.

3.02 TESTS AND INSPECTION

- A. Valve may be either tested while testing pipelines, or as a separate step.
- B. Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other, in both directions for two-way valve and applications.
- C. Inspect air and vacuum valves as pipe is being filled to verify venting and seating is fully functional.
- D. Count and record number of turns to open and close valve; account for any discrepancies with manufacturer's data.
- E. Set, verify, and record set pressures for all relief and regulating valves.
- F. Test hydrostatic relief valve seating; record leakage. Adjust and retest to maximum leakage of 0.1 gpm per foot of seat periphery.

END OF SECTION

VALVES AND OPERATORS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 16010
ELECTRICAL GENERAL REQUIREMENTS****PART 1 - GENERAL****1.1 SCOPE OF WORK**

- A. The general provisions of the Contract, including General Conditions, apply to all the work specified in the Electrical 16000 Sections.
- B. It is the intent of the Specifications to construct a complete and working installation. Items of equipment or materials which may reasonably be assumed as necessary to accomplish this end shall be supplied whether or not they are specifically stated herein.

1.2 LAWS, PERMIT, FEES, AND NOTICES

- A. Secure and pay all permits, fees and licenses necessary for the proper execution and completion of the work. Submit all notices and comply with all laws, ordinances, rules and regulations of any public agency bearing on the work, this shall include but not be limited to the authority having jurisdiction over the work.

1.3 DEPARTURES

- A. If any departures from the Contract Drawings or Specifications are deemed necessary, details of such departments and the reasons therefore shall be submitted as soon as practicable to the Engineer for advance written approval.

1.4 BASIS FOR WIRING DESIGNS

- A. The Contract Drawings and Specifications describe specific size of switches, breakers, fuses, conduits, conductors, motor starters, and other items of wiring equipment. These sizes are based on specific items of power consuming equipment (heaters, lights, motors for fans, compressors, pumps, etc.). Wherever another trade provides power consuming equipment which differs from Drawings and Specifications, the wiring for such equipment shall be changed to proper sizes to match at no additional expense to the City.

1.5 GUARANTEES

- A. Final Acceptance – Furnish written guarantee covering all materials, workmanship, and equipment for a period of one (1) year from the date of acceptance as described in the Contract General Conditions.
- B. The City reserves the right to operate and use all materials and equipment failing to meet the requirement of the Contract Documents until such unacceptable materials and equipment are replaced or repaired to the satisfaction of the Engineer.
- C. Provide certificate of proper installation from the manufacture or vendors of major equipment.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.6 AS BUILT INFORMATION

- A. A set of "red-lined" electrical drawings shall be carefully maintained at the job site. Actual conditions are to be put on the drawings in red on a daily basis so the drawings will continuously show locations and routings of cable trays, conduits, pull boxes, circuit numbers, and other information required by the Engineer. After completion of the project, a set of "red-lined" electrical drawings shall be submitted to the Engineer.

1.7 JOB SITE VISIT

- A. Visit the project site before submitting a bid. Verify all dimensions shown on the contract drawings and determine the characteristics of existing facilities which will affect performance of the work, which are not shown on drawings or described within these specifications.
- B. The electrical drawings were developed from past record drawings and information furnished by the owner. Verify all scaled dimensions prior to submitting bids.
- C. Before submitting a bid, visit the site and determine conditions at the site and at all existing structures in order to become familiar with all existing conditions and electrical systems which will, in any way or manner, affect the work required under this Contract. No subsequent increase in Contract cost will be allowed for additional work required because of the Contractor's failure to fulfill this requirement.
- D. After award of Contract, confer with the Engineer to verify at each area of construction activity the location of existing underground utilities. Protect all existing underground utilities during construction. Pay for all required repairs without increase in Contract cost should damage to underground utilities occur during construction.

1.8 CLEANUP

- A. Maintain a continuous cleanup during the progress of the work and use appointed storage areas for supplies. The premises shall be kept free from accumulations of waste materials and rubbish.

1.9 CUTTING AND PATCHING

- A. Cut and prepare all openings, chases and trenches required for the installation of equipment and materials. Repair, remodel and finish in strict conformance with the quality of workmanship and materials in the surrounding. Obtain written permission from the Engineer for any alterations to structural members before proceeding. All penetrations through fire walls shall be sealed to maintain the fire integrity of the wall.
- B. Installations including but not limited to, raceway systems and supports shall be completed in a fashion to avoid creating tripping hazards. Reroute any installation at the discretion of the Engineer should it be necessary. The cost of the alternate such as core drilling shall be in this contract.

1.10 MAINTENANCE

- A. Render all necessary measures to ensure complete protection and maintenance of all systems, materials, and equipment prior to final acceptance. Any materials or equipment not properly maintained or protected to assure a factory new condition at the time of final

D-37 PUMP STATION REPLACEMENT**PROJECT 11766**

acceptance shall be replaced immediately with new equipment, at no additional cost to the City.

1.11 WATERPROOFING

- A. Whenever any work penetrates any waterproofing, seal and render the work waterproof. All work shall be accomplished so as not to void or diminish any waterproofing bond or guarantee.

1.12 TESTS

- A. The equipment shall be demonstrated to operate in accordance with the requirements of these specifications. The test shall be performed in the presence of the Engineer or an authorized representative. The electrical contractor shall furnish all instruments, electricity and personnel required for the test specified elsewhere in these specifications. The electrical contractor shall schedule manufacturer's representatives to be present as required.

1.13 POWER OUTAGES

- A. The work shall be coordinated to require a minimum amount of time for power outages. The electrical contractor shall furnish all equipment, temporary power, portable generators and personnel required during the power outages. Requests shall be made in writing to the City at least 48 hours prior to the outage.
- B. Carry out any work involving the shutdown of the existing services to any piece of equipment now functioning in existing areas at such time as to provide the least amount of inconvenience to the City. Do such work when directed by the Engineer.

1.14 SUMMARY OF ELECTRICAL WORK

- A. Provide all labor, materials, tools, supplies, equipment and temporary utilities to complete the work shown on the drawings and specified herein. All systems are to be completely installed and fully operational. The work comprises of at least:
 - 1. Power/control wiring installation and connection
 - 2. Raceway systems including duct banks
 - 3. Temporary power as required
 - 4. Grounding and bonding
 - 5. Testing of all systems
 - 6. Miscellaneous
 - 7. Electrical testing

1.15 ELECTRICAL COORDINATION

- A. The electrical contractor is responsible for coordination with the City, Engineers, other trades, the power company and the telephone company on all matters which have a bearing on the electrical work.
- B. The contract drawings indicate the extent, the general location and arrangement of equipment, conduit and wiring. Study the contract drawings, including details, so that equipment shall be properly located and readily accessible. Locate all electrical equipment to avoid interference with mechanical and/or structural features. Make necessary changes in spacing and location

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. of lighting fixtures, panelboards, cabinets, receptacles, and other items of equipment provided that the overall patterns of layouts are not disrupted and remain uniform.
- D. Coordinate with instrumentation contractor. Electrical contractor shall provide all conduit systems, wiring and terminations for instrumentation. Instrumentation contractor will supervise installation and termination. The electrical contractor shall further coordinate with all other divisions to assure proper interfacing of all equipment being furnished.

1.16 CODES AND STANDARDS

- A. General – Applicable provisions of the following codes and standards and other codes and standards required by the State of Florida and local jurisdictions are hereby imposed on a general basis for electrical work (in addition to specific applications specified by individual work sections of these specifications):
 - 1. U.L.: Electrical materials shall be approved by the Underwriter's Laboratories, Inc. This applies to materials which are covered by U.L. standards. Factory applied labels are required.
 - 2. National Electric Code.
 - 3. OSHA: Standards of the Occupational Safety and Health Administration are to be complied with.
 - 4. NEMA: National Electrical Manufacturers Association Standards are to be met wherever standards have been established by that agency, and proof is specifically required with material submittals for switchboards, motor control centers, panelboards, cable trays, motors, switches, circuit breakers, and fuses.
 - 5. ANSI: American National Standards Institute
 - 6. NESC: National Electrical Safety Code
 - 7. NECA: National Electrical Contractors Association
 - 8. IEEE: Institute of Electrical and Electronic Engineers

1.17 ELECTRICAL TEMPORARY FACILITIES

- A. The electrical contractor shall include in his bid the cost of furnishing, installing, maintaining, and removing all materials and equipment required to provide temporary light and power to perform the work of all trades during construction and until work is completed, including the supply, operation and maintenance of portable generators if required. Adequate lighting and receptacle outlets for operation of hand tools shall be provided throughout the project, including shanties, trailers, field offices, temporary toilet enclosures, and shall be extended as construction progresses.
- B. Electrical Safety:
 - 1. All responsibility for electrical safety to protect workers and the public from electrical shock and any hazard shall be by the electrical contractors.
 - 2. All reasonable safety requirements shall be observed to protect workers and the public from shock and fire hazards.

1.18 EXCAVATING FOR ELECTRICAL WORK

- A. General – Excavation or drilling, backfill and repair of paving and grassing is to be in the bid of the electrical contractor. The actual work need not be performed by electrical trades.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. However, the electrical contractor is responsible for all excavation, drilling, dewatering, backfilling, tamping, and repair of pavements and grassing required in support of electrical work. All areas disturbed by electrical work shall be repaired to their original condition, or as indicated on the drawings.
- B. Coordination:
1. The electrical contractor must check for existing utilities before commencing any excavation or drilling.
 2. Contract drawings and other trades are to be consulted to avoid interferences with other utilities on this project.
 3. In the event of damage to existing utilities, the Engineer shall be immediately notified, and damage shall be immediately repaired by the Contractor with no expense to the City.
 4. The City is to be consulted to ascertain locations of existing interferences by referring to "As-Built" drawings and City's experience. The excavations are to be scheduled at the City's convenience.
 5. Exploratory excavation such as pot holing may be required to avoid damage to existing utilities and equipment. The cost of all exploration shall be included in this bid.
- C. Precautions – The electrical contractor must take every reasonable precaution to avoid interferences. In the vicinity of a suspected interference, excavations shall be dug by hand.
- D. Excavating, Drilling and Backfilling
1. All excavating and trenching shall be done after being verified by Sunshine.
 2. Do not excavate for electrical work until the work is ready to proceed without delay, so that the total time lapse from excavation to completion of backfilling will be minimum.
 3. Excavate with vertical-sided excavations to the greatest extend possible, except where otherwise indicated. Where necessary, provide sheeting and cross-bracing to sustain sides of excavations, and to avoid damage to adjacent structures such as tanks, buildings, and etc. Remove sheeting and cross-bracing during backfilling wherever such removal will not endanger the work or other property. Where not removed, cut sheeting off at a sufficient distance below finished grade to not interfere with other work.
 4. Locate and protect existing utilities and other underground work in a manner which will ensure that no damage or service interruption will result from excavating and backfilling.
 5. Protect property from damage which might result from excavating and backfilling.
 6. Dewater excavations as necessary. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations; protect excavations and below grade property from being damaged by water, sediment or erosion from or through electrical work excavations.
 7. No organic material is permitted in backfill. All vegetation, peat, sod, or other organic matter shall be removed from the premises.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

8. Except under roadways, backfill materials shall be clean sand. No debris or trash may be used as backfill.
9. Under roadways, backfill material shall be the same as comprising the road bed.
10. Backfill excavations in 8" high courses of backfill material, uniformly compacted to 95% density per ASTM Standard D 1557 using power-driven hand-operated compaction equipment. Watering backfill is not an adequate method of compaction. All work shall meet standards in Division 02200 and 02221.
11. Backfill to elevations matching adjacent grades, at the time of backfilling excavations for electrical work. Where subsidence is measurable or observable at electrical work excavations during the warranty period, remove the surface (pavement, lawn, or other finish) add backfill material, compact, and replace the surface treatment. Restore the appearance, quality, and condition of the surface or finish to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.
12. Where excavation and backfill for electrical work pass through or occur in a landscaped area, repair or replace the landscape work to match the original condition and quality of the work.
13. Where excavation and backfill for electrical work pass through or occur in an area of paving or flooring, replace and restore the construction and finish of paving or flooring to match the original condition and quality of the work.

1.19 ELECTRICAL SUBMITTALS**A. Submittals for Approval:**

1. Refer to Contract General Conditions for additional instructions on submittals and substitutions. Where conflicts occur between the General Conditions and this Section, the more stringent requirements shall apply.
2. Shop Drawings and manufacturer's data sheets are required for all electrical materials.
3. Submittals will not be accepted for partial systems. Submit all materials for each specifications section at one time. Submittals must be arranged, correlated, indexed, and bound in orderly sets for ease of review.
4. Samples are to be supplied for any substitute as requested by the Engineer.
5. The following numbers of copies are required:

Shop Drawings	4 sets
Samples	1 each
Manufacturer's data	4 sets
Certifications	4 sets
Test reports	4 sets
Warranties/Guarantees	4 sets

6. Submit shop drawings, manufacturer's data, and certifications on all items of electrical work prior to the time such equipment and materials are to be ordered. Order no

D-37 PUMP STATION REPLACEMENT**PROJECT 11766**

equipment or materials without approval from the Engineer. Submittals will not be accepted for partial system submittals; submit all data at one time. Submittals will be promptly returned, approved, approved as noted, or not approved. Items "approved as noted" must be changed to comply with the Engineer's comments and need not be resubmitted for "approved" status. Items "not approved" are not suitable, requiring complete new submittals.

7. Time delays caused by rejection of submittals are not cause for extra charges to City or time extensions.

B. Maintenance Manuals

1. Submit to the City three (3) copies and to the Engineer one (1) copy of all manufacturer's services, installation and operation manuals, instructions and bulletins. Service manuals must contain, but are not limited to, the following:
 - a. Brief description of system and basic features.
 - b. Manufacturer's name and model numbers of all components of the system.
 - c. List of local factory authorized service companies.
 - d. Operating instructions, including preparation for starting up, seasonal changes, shut down and service.
 - e. Maintenance instructions.
 - f. Possible breakdowns and repairs.
 - g. Manufacturer's literature describing each piece of equipment.
 - h. Control diagrams by the control manufacturer.
 - i. Description of sequence by the control manufacturer.
 - j. Parts list.
 - k. Wiring diagrams.

C. Spare Parts

Submit a list of recommended spare parts for all major items of equipment – include description of each part, part number and cost.

PART 2 – PRODUCTS**2.1 ELECTRICAL PRODUCTS****A. Standard Products**

1. Unless otherwise indicated in writing by the Engineer, the products to be furnished under this specification shall be the manufacturer's latest design. Where two or more units of the same class of equipment are required, these units shall be products of the same manufacturer. Units of equipment and components of the same purpose and rating shall be interchangeable throughout the project.
2. All products shall be newly manufactured. Defective equipment or equipment damaged in the course of installation or test, shall be replaced or repaired in a manner meeting with the approval of the Engineer, at no additional expense to the City.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Delivery, Storage, and Handling – Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identification; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage. Comply with City's instructions for storage locations. Connect all temporary space heaters (which are part of the permanent installation) at the time equipment is delivered on site.
- C. Substitutions – Comply with instructions in the Contract General Conditions and Special Conditions regarding substitutions.

2.2 ELECTRICAL IDENTIFICATION

- A. Color Coding – Conductor colors shall be in accordance with the N.E.C., local agencies and NFPA requirements. Refer also to applicable sections of these specifications. Three phase feeder and branch circuits shall be identified as follows:

<u>120 / 208</u>	<u>277 / 480</u>
A – Black	A – Brown
B – Red	B – Purple
C – Blue	C – Yellow
Neutral – White	Neutral – Grey

Green or bare for grounding conductors
 Green with yellow trace: Special Grounding

- B. Nameplates

1. The following items shall be equipped with nameplates: All motors, motor starters, motor control centers, pushbutton stations, control panels, time switches, disconnect or relays in separate enclosures, receptacles, wall switches, panelboards, switchboards instrumentation cabinets, high voltage boxes and cabinets. All light switches and outlets shall carry a phenolic plate with the supply circuit number engraved. Special electrical systems shall be identified at junction and pull boxes, terminal cabinets, and equipment racks.
2. Nameplates shall adequately describe the function of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 277/480V, 3-phase, 4-wire". The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and F.L. STATION NAMEPLATES FOR THAT MACHINE. Normal power nameplates shall be laminated phenolic plastic, white front and back with black core, with lettering etched through the outer covering; black engraved letters on white background. Lettering shall be 3/16 inch high at pushbutton stations, thermal overload switches, receptacles, wall switches and similar devices, where the nameplate is attached to the device plate. AT all other locations, lettering shall be ¼ inch high, unless otherwise detailed on the Drawings. Nameplates shall be securely fastened to the equipment with No. 4 Phillips, round-head, cadmium plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be non-ferrous metal not less than 0.03 inch thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Engraved lettering shall be filled with contrasting

D-37 PUMP STATION REPLACEMENT**PROJECT 11766**

enamel. Equipment nameplate schedule for all equipment shall be submitted with shop drawing submittal for Engineer's approval.

3. All junction and splice boxes shall be labeled using permanent shipping tags attached to boxes; not covers.
- C. Wire and Cable Identification – All wire and cable shall be identified at each termination point and at each pull box, splice box, junction box, or manhole. Provide permanent, waterproof, non-metallic heat shrinkable tube cable markers in 3/16 inch letters.
- E. Signs – Warning signs shall comply with OSHA requirements and reasonable safety precautions.
- F. Underground Identification – During backfilling of each exterior underground electrical, signal, or communication cable, conduit, or ductbank, install a continuous underground-type plastic with foil backed line, marker, located directly over the buried line at six (6) inches to eight (8) inches below finished grade.
- G. Rubber Mat – Provide U.L. approved rubber mat running the full length on all switchboards, MCC's, control panels, etc.

PART 3 – EXECUTION**3.1 TESTS**

- A. Carry out tests specified hereinafter and as indicated under individual items of materials and equipment specified in other sections and in Section 16950, Electrical Testing. Coordinate tests performed by manufacturer, suppliers, and equipment representatives of other equipment containing electrical apparatus.

3.2 OPERATIONS

- A. After the electrical system installation is completed and at such time as the Engineer may indicate, conduct an operating test for approval. Demonstrate that the equipment operate in accordance with the requirements of these Specifications and Drawings. Demonstrate that protective functions are operating properly and are properly incorporated in control system, circuit breaker, and motor control center circuitry. Perform the test in the presence of the Engineer. Furnish all instruments and personnel required for the tests. The City will furnish the necessary electric power.

3.3 VOLTAGE

- A. When the installation is essentially complete and the plant is in operation, check the voltage at the point of termination of the power company supply system to the project. Check voltage amplitude and balance between phases for loaded and unloaded conditions.
- B. Record the supply voltage (all three phases simultaneous on the same graph) for 24 hours during a normal working day. Submit the recording with a letter of transmittal to the City and the Engineer within 5 days of the date the test was taken.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. If an unbalance (as defined by NEMA) exceeds 1 percent, or if the voltage varies throughout the day and from loaded to unloaded conditions more than plus or minus 4 percent of nominal, make a written request to the power company, with a copy to the Engineer, that the condition be corrected. If corrections are not made, obtain from a responsible power company official a written statement that the voltage variations and/or unbalance are within their normal standards. Send a copy of this statement with a transmittal letter to the Engineer.

3.4 EQUIPMENT LINE CURRENT

- A. Check the line current in each phase for each piece of equipment. If the power company makes adjustments to the supply voltage magnitude or balance, make the line current check after the adjustments are made. If any phase current in any piece of equipment is above the rated nameplate current, determine the cause of the problem and submit it in writing to the Engineer.
- B. Tests Reports – Submit written test results in a format by phase to phase and phase to ground, for voltage and each phase for current. The format for these submittals test results will be provided to the Engineer.

END OF SECTION 16010

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 16150
MOTORS****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. All motors shall be furnished as called for on the Drawings and shall be in conformance with the requirements of this section.

1.2 QUALIFICATIONS

- A. Routine tests shall be performed on representative motors, and shall include the information described on NEMA MG1 12.54 "Report of Test Form for Routine Tests on Induction Motors". Efficiency shall be determined in accordance with IEEE Publication No. 112, Method B. Power factor shall be measured on representative motors.

1.3 SUBMITTALS

- A. Submittal of motor data for acceptance shall include complete nameplate data and test characteristics in accordance with NEMA Standard MG1 12.54 "Report of Test Form for Routine Tests on Induction Motors" and, in addition, the following for motors typical of the units furnished:
 - 1. Efficiency at 1/2, 3/4 and full load
 - 2. Power factor at 1/2, 3/4 and full load
 - 3. Motor outline, dimensions and weight
 - 4. Descriptive bulletins, including full description of insulation system
 - 5. Bearing design data
 - 6. Special features (i.e., temperature detectors, etc.)
- B. The motor manufacturer shall submit to the ENGINEER as provided in Section 01300, certified dimension prints showing nameplate data and outline dimensions within three weeks of the date they receive the order.
- C. Guarantee: All equipment furnished and installed under this Section shall be guaranteed against defects of workmanship, materials and proper installation for a period of one (1) year from date of acceptance. All such equipment or parts proven defective, due to the above noted causes, shall be replaced in the machines by the Contractor at no expense to the Owner.
- D. Provide equipment warranty in accordance with Section 01740.

1.4 REFERENCE STANDARDS

- A. Institute of Electrical and Electronics Engineers (IEEE)
- B. National Electrical Manufacturers Association (NEMA)

MOTORS

16150-1

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 PRODUCTS**2.1 GENERAL**

- A. Unless otherwise noted, all motors 1/2 horsepower and above shall be rated 230/460 volt, 3 phase, 60 Hertz A.C. and motors below 1/2 horsepower shall be rated 115/230 volt, 1 phase, 60 Hertz A.C.
- B. All motors shall be built in accordance with current NEMA, IEEE, ANSI and AFBMA standards. Motors shall be of the type and quality described by this Section and other Divisions of the Specifications, and/or as shown on the Drawings, fully capable of performing in accordance with Manufacturer's nameplate rating, and free from defective material and workmanship.

2.2 RATINGS

- A. All motors shall be sufficient size for the duty to be performed and shall not exceed their full-rated load when the driven equipment is operating at specified capacity and over the operational range. Unless otherwise noted, motors driving pumps, blowers, etc. shall not be overloaded at any head or discharge condition. The motor shall not be required to deliver more than its rated nameplate horsepower, at the 1.0 service factor, under any condition of mechanical or hydraulic loading (i.e. although a 1.15 service factor is required, it may not be used under any condition).
- B. Each motor shall develop ample torque for its required service throughout its acceleration range at a voltage 10 percent below nameplate rating. Where shown on the Electrical Drawings to be operated on a reduced voltage starter, the motor shall develop ample torque under the conditions imposed by the reduced voltage starting method.
- C. All motors shall be continuous time rated suitable for operation in a 40 degrees C ambient unless noted otherwise.
- D. Specific motor data such as Hp, rpm, etc., is specified under the detailed specification for the equipment with which the motor is supplied.

2.3 NAMEPLATES

- A. The motor manufacturer's nameplates shall be engraved or embossed on stainless steel and fastened to the motor frame with stainless steel screws or drive pins. Nameplates shall indicate clearly all of the items of information enumerated in NEMA Standard MG1 10.38 or MG1 20.60, as applicable.

2.4 WINDING TEMPERATURE DETECTORS

- A. Winding temperature detectors, unless specified otherwise herein shall be a factory installed, embedded, bi metallic switch type with leads terminating in the main conduit

MOTORS

16150-2

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

box. This device shall protect the motor against damage from overheating caused by single phasing, overload, high ambient temperature, abnormal voltage, locked rotor, frequent starts or ventilation failure. The switch shall have normally open contacts. Not less than three detectors shall be furnished with each motor.

2.5 THREE PHASE INDUCTION MOTORS

- A. Unless specifically noted in other Sections of these Specifications, all motors shall have minimum efficiencies as listed below:

<u>Horsepower</u>	<u>NEMA Nominal Efficiency, %</u>
1-2	84.0
3-5	88.5
7-1/2	89.5
10	90.2
15	91.0
20	92.0
25	92.2
30	92.4
40-50	94.0
60-100	94.5
Over 100	95.0

2.6 CONSTRUCTION

A. General:

1. All drip-proof and weather protected Type I and Type II motors shall have epoxy encapsulated windings. Totally enclosed motors shall be provided with an upgraded insulation by additional dips and bakes to increase moisture resistance and shall not be encapsulated. Motors for outdoor service shall have vacuum pressure impregnated (VPI) epoxy insulation for moisture resistance. Two speed motors shall be of the two winding type.
2. Squirrel-cage rotors shall be made from high-grade steel laminations adequately fastened together and to the shaft, or shall be cast aluminum or bar-type construction with brazed end rings.
3. All motors shall be of the premium efficiency and high power factor type. All motors shall be the corrosion resistant type conforming to motors designated as "Corro-Duty" by U.S. Motors or equal.
4. Vertical motors shall be hollow or solid shaft as required by the equipment furnished under other Sections of these Specifications.
5. Totally enclosed non-ventilated (TENV) motors shall include the same ratings and accessories as specified for TEFC motors. Explosion-proof motors shall be UL listed and FM approved for Class 1, Division 1 hazardous areas.

B. Low Voltage, Three Phase Motors:

MOTORS

16150-3

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Motors shall be of the squirrel-cage induction type. Horizontal, vertical solid shaft, vertical hollow shaft, normal thrust and high thrust types shall be furnished as called for on the Drawings and as specified in other Sections of these specifications. Motors shall be of the type and quality described by these Specifications, and/or as shown on the schedule on the Drawings, fully capable of performing in accordance with Manufacturer's nameplate rating, and free from defective material and workmanship.
2. Motors shall have normal or high starting torque (as required), low starting current (not to exceed 650 percent full load current), and low slip.
3. Unless otherwise specified, motors shall be totally enclosed fan-cooled construction with a 1.15 service factor at the Class B Temperature Rise.
4. The output shaft shall be suitable for direct connection or belt drive as required.
5. Motors shall have a Class F non-hygroscopic insulation system but shall be limited to Class B Temperature Rise, at 1.15 service factor.
6. All motors shall have a final coating of chemical resistant corrosion and fungus protective epoxy fortified enamel finish sprayed over red primer over all interior and exterior surfaces. Stator bore and rotor of all motors shall be epoxy coated.
7. All fittings, bolts, nuts, and screws shall be plated to resist corrosion. Bolts and nuts shall have hex heads.
8. All machine surfaces shall be coated with rust inhibitor for easy disassembly.
9. Conduit box shall be split from top to bottom and shall be capable of being rotated to four 90 degree positions. Synthetic rubber-like gaskets shall be provided between the frame and the conduit box and sealed with a non-wicking, non-hygroscopic insulating material. A frame mounted pad with drilled and tapped hole, not less than 1/4-inch diameter, shall be provided inside the conduit box for motor frame grounding. All motor conduit boxes shall be provided with the correct number of conduit openings sized as indicated on the drawings. Boxes shall be suitably sized for conductor bending and terminations.
10. Totally enclosed motors shall be provided with condensate drain hole and epoxy coated motor windings to protect against moisture.
11. Nameplates shall be stainless steel. Lifting lugs or "O" type bolts shall be supplied on all frames 254T and larger. Enclosures shall have stainless steel screens. Motors shall be protected for corrosion, fungus and insects.
12. Low voltage, three phase motors shall be manufactured by U.S. Motors, Reliance Electric or Baldor.
13. **Fractional Horsepower:**
 - a. Fractional horsepower motors shall be rigid, welded-steel, designed to maintain accurate alignment of motor components and provide adequate protection. End shields shall be cast iron or heavy fabricated steel. Windings shall be of varnish-insulated wire with slot insulation of polyester film, baked-on bonding treatment to make the stator winding strongly resistant to heat, aging, moisture, electrical stresses and other hazards.
 - b. Motor shaft shall be made from high-grade, cold-rolled shaft steel with drive-shaft extensions carefully machined to standard NEMA dimensions for the particular drive connection.
 - c. For light to moderate loading, bearings shall be quiet all-angle sleeve type with large oil reservoir that prevents leakage and permits motor operation in any position.

MOTORS

16150-4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- d. For heavy loading, bearings shall be carefully selected precision ball bearings with extra quality, long-life grease, and large reservoir providing 10 years normal operation without relubrication.

14. **Integral Horsepower:**

- a. Motor frames and end shields shall be cast iron or heavy fabricated steel of such design and proportions as to hold all motor components rigidly in proper position and provide adequate protection for the type of enclosure employed.
- b. Windings shall be adequately insulated and securely braced to resist failure due to electrical stresses and vibrations.
- c. The shaft shall be made of high-grade machine steel or steel forging of size and design adequate to withstand the load stresses normally encountered in motors of the particular rating. Bearing journals shall be ground and polished.
- d. Rotors shall be made from high-grade steel laminations adequately fastened together, and to the shaft. Rotor squirrel-cage windings may be cast-aluminum or bar-type construction with brazed end rings.
- e. Motors shall be equipped with vacuum-degassed anti-friction bearings made to AFBMA Standards, and be of ample capacity for the motor rating. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent lubrication, but facilities shall be provided for adding new lubricant and draining out old lubricant without motor disassembly. The bearing housing shall have long, tight, running fits or rotating seals to protect against the entrance of foreign matter into the bearings, or leakage of lubricant out of the bearing cavity.
- f. Bearings of high thrust motors will be locked for momentary upthrust of 30 percent downthrust. All bearings shall have a minimum B10 life rating of 5 years in accordance with AFBMA life and thrust values.
- g. Vertical hollow-shaft motors will have non-reverse ratchets to prevent backspin. Non-reverse ratchets shall be suitable for duty with variable frequency drives.

C. Low Voltage, Single Phase Motors:

- 1. Single phase motors shall be split-phase and capacitor-start induction types rated for continuous horsepower at the rpm indicated on the drawings or as required by the specifications. Motors shall be rated 115/230 volts, 60 Hertz, single phase, open drip-proof, or totally enclosed fan cooled as indicated on the drawings or as required by the specifications, with temperature rise in accordance with NEMA Standards for Class B insulation.
- 2. Totally enclosed fan cooled motors shall be designed for severe-duty.
- 3. Motors shall have corrosion and fungus protective finish on internal and external surfaces. All fittings shall have a corrosion protective plating.
- 4. Mechanical characteristics shall be the same as specified for polyphase fractional horsepower motors.

PART 3 EXECUTION

3.1 TESTS AND CHECKS

MOTORS

16150-5

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. The following tests shall be performed on all motors after installation but before putting motors into service.
1. The Contractor shall megger (1000 volts DC) each motor winding before energizing the motor, and, if insulation resistance is found to be low, shall notify the ENGINEER and shall not energize the motor. The following table gives minimum acceptable insulation resistance in megohms at various temperatures and for various voltages with readings being taken after one (1) minute of megger test run.

MOTORS

16150-6

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

<u>Winding Temperature</u>		<u>Degrees</u> <u>Voltage</u>		
<u>E</u>	<u>C</u>	<u>115 V.</u>	<u>230 V.</u>	<u>460V.</u>
37	3.9	60	108	210
50	10	32	60	120
68	20	13	26	50
86	30	5.6	11	21
104	45	2.4	4.5	8.8
122	50	1	2	3.7
140	60	0.50	0.85	1.6

2. The Contractor shall check all motors for correct clearances and alignment and for correct lubrication, and shall lubricate if required in accordance with Manufacturer's instructions. The Contractor shall check direction of rotation of all motors and reverse connections if necessary. The correction for wrong rotational direction shall be made at the motor.
 3. All tests shall meet the requirements of, but not be limited to, IEEE 43, 85 and 112. Efficiency tests for IEEE 112 shall include Method B.
 4. The Contractor shall provide to the ENGINEER a typed list of all motors 1 HP and larger listing the no load motor current and voltage and the full load current and voltage. Any phase current imbalance greater than 10% shall be reported to the ENGINEER.
- B. Field testing and commissioning shall be done in accordance with the latest revision of the "Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems" published by the InterNational Electrical Testing Association (NETA Standard ATS-2003).

END OF SECTION

MOTORS

16150-7

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 16416
MANUAL TRANSFER SWITCHES****PART 1 - GENERAL REQUIREMENTS****1.1 Related Documents**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

- A. Furnish and install Manual Transfer switches rated 600V and less as specified herein and as required for proper control and distribution of the normal and standby power sources throughout the Project as indicated on the Drawings.

1.3 Submittals

- A. Product Data: Include ratings and dimensioned plans, sections, and elevations showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- B. Drawings. Outline, Schematic and Part Layout drawings shall be provided for each switch. Drawings shall differentiate between manufacturer-installed and field installed wiring. Show both power and control wiring. Drawings and diagrams shall be "as built" shop drawings identifying the switch by serial number. Such drawings shall be unique to the serial number of the switch they represent and shall include only those features of the specific switch.
- C. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements and that switches have been tested for load ratings and short-circuit closing and withstand ratings applicable to units for project.
- D. Maintenance Data: For each type of product, include maintenance manuals as specified in Division One. Include all features and operating sequences, both manual and manual. List all factory settings of relays and provide relay setting and calibration instructions, including software, where applicable.

1.4 Quality Assurance.

- A. Manufacturer Qualifications: Maintain a service center capable of providing emergency maintenance and repairs at Project site with a twenty-four-hour maximum response time.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for emergency service under U.L. 1008, by a testing agency acceptable to authorities having jurisdiction.
- C. The Transfer Switch shall comply with the following where applicable:
 - 1. NEMA ICS 1 - General Standard for Industrial Controls and Systems

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. NEMA ICS 2 –447 – A C Manual Transfer Switches
3. NEMA ICS 250 – Enclosures for Electrical Equipment
4. Canadian Standard Association
6. NFPA 70 – Article 230 – Services
7. NFPA 70 – Article 250 – Grounding
8. NFPA 70 – Article 517 – Health Care Facilities
9. NFPA 70 – Article 700 Emergency Systems
10. NFPA 70 – Article 701 – Legally Required Standby Systems
11. NFPA 70 – Article 702 – Optional Standby Systems
12. NFPA 99 – Health Care Facilities
13. NFPA 110 – Emergency & Standby Power Systems
14. UL 508 Industrial Control Panels
15. UL 1008 – Transfer Switch Equipment
16. NFPA 20 – Stationary Pumps for Fire Protection

PART 2 - PRODUCTS**2.1 Manufacturers**

- A. The manual transfer switch shall be a standard product of a manufacturer regularly engaged in the manufacture of manual transfer switches for a period of at least 10 years.
- B. Subject to compliance with requirements, provide products by one of the following:
 1. Lake Shore Electric Corporation.
 2. Square D
 3. Siemens
 4. Equal as approved by the Engineer

2.2 Transfer Switch Construction and General Product Requirements

- A. The manual transfer switch shall be 100% rated for continuous duty and suitable for use in emergency situations. Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp load not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. The complete manual transfer switch shall be listed under U.L. 1008 for use on emergency systems.
- C. Four Pole manual transfer switches shall have all four poles of equal construction including, among other characteristics, arcing contacts, main contacts, and arc chutes. A neutral assembly shall be provided on all 3-pole switches when required.
- D. The manual transfer switch shall be rated to withstand the RMS symmetrical short circuit fault current available at the transfer switch as shown on the drawings. The manufacturer shall provide certification of compliance to all U.L. and NEMA Standards referred to above.
- F. The manual transfer switch shall be positively and reliably interlocked to prevent both sources from being simultaneously connected to the load unless intended.
- G. The manual transfer switch shall be mechanically held and electrically operated, energized by the source to which it is being transferred. It shall consist of two molded case switches, actuated by motor operators. Connection to the transfer mechanism shall be accomplished by a simple over-center toggle mechanism of the switches, which shall mechanically lock the main contacts in place. Main contacts shall be fully rated, self-wiping, and arc quenching. Separate arcing contacts with magnetic blowouts shall be provided.
- H. The manual transfer switch shall be provided with a permanently attached means to manually operate the switch without the use of special tools, devices or fixtures. The manual operating means shall provide safety to operators performing transfer under load. The manual operator shall transfer the switch with the same contact-to-contact transfer speed as the electrical operator. The transfer switch shall be "Load Break" rated when manually operated. The inability to manually operate the transfer switch without first disconnecting loads will not be acceptable.
- I. The transfer switch shall be accessible from either top or bottom entry into the enclosure. All control components and wiring shall be front accessible

2.3 Manual Transfer Switch Controls

- A. Controls shall be microprocessor based and shall provide all necessary functions of the manual transfer switch. The controller shall be equipped with a real time and date clock, battery backup, and non-volatile memory storage.
- B. An HMI shall be provided containing a 2 line, 40 character, LCD display, LED indicating lights as specified herein, and a touch pads to allow access to the system.
- C. The controller shall be equipped to accept power quality or condition signals from a variety of external relays or monitors connected to either the normal or emergency sources.
- D. The controller shall store all timer and mode settings in non-volatile memory so that upon re-energizing the switch it will return to the previous position without loss of data.
- E. The controller shall allow for four modes of operation: Off/Reset, Load Test, Hand Crank and Fault.
- F. In the fault mode, the transfer switch shall be locked out and the reason for its failure shall be

MANUAL TRANSFER SWITCHES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

displayed on the HMI display.

- G. The controller shall have complete diagnostic capabilities so that every input and output can be monitored for troubleshooting or maintenance purposes.
- H. The controller shall have an operating range of -40°C to +85°C
- I. The controller shall meet IEEE C62.41 surge test.
- J. The controller shall be able to withstand unlimited power interruptions.

2.4 Manual Transfer Switch Features

- A. A Close Differential Under Voltage Relay shall be provided to continuously monitor normal voltage. The under voltage relay shall be field adjustable from 70% (seventy percent) to 100% (one hundred percent) of nominal voltage. Factory set at 90% (ninety percent) pick-up and 80% (eighty percent) dropout.
- B. A single-phase frequency and voltage-sensing relay shall be provided for protection against transferring to the Emergency source until the generator has reached both operating frequency and voltage.
- C. A Customer Relay Interface Board shall be provided to allow customer interface to the transfer switch controls. All interfaces shall be voltage free contacts rated 10 amps at 120 vac. The following interface points shall be made available.
 - 1. Engine start contacts consisting of one normally open and one normally closed.
 - 2. Switch Position contacts consisting of two normally open and two normally closed.
 - 3. Trouble contacts consisting of one normally open and one normally closed.
- D. Light Emitting Diode (LED) pilot lights shall be provided on the HMI panel to indicate the following conditions:
 - 1. Normal Source Available
 - 2. Normal Switch Closed
 - 3. Emergency Source Available
 - 4. Emergency Switch Closed
 - 5. System not in Manual (Flashing light)
- E. A Maintenance Disconnect switch shall be provided to disconnect control circuitry from line for maintenance purposes.
- F. A momentary Load Test Switch shall be mounted inside the enclosure for ease of servicing. This switch shall cycle the transfer switch through a complete transfer to emergency and retransfer to

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

normal.

- G. A Key Pad Enable Switch shall be mounted inside the enclosure, which will inhibit use of the HMI operator interface.
- H. An Override Pushbutton shall be provided, mounted on the inside of the enclosure to bypass the Time Delay to Return Timer.

2.5 Enclosures

- A. The transfer switch shall be enclosed in an NEMA 4X Standards Publication 250, Type 1 wall mounted enclosure unless otherwise shown on the drawings or elsewhere herein.

2.6 Finishes

- A. Enclosures: Stainless Steel 316.

2.7 Source Quality Control

- A. Factory test components assembled switches and associated equipment to ensure proper operation. Check transfer time and voltage, frequency and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 – EXECUTION

3.1 Application.

- A. ATS # 1: NEMA 1, 3 poles, 800 amperes, 277/480 volts, 3 phase, 4 wire, 60 hertz.

3.2 Installation.

- A. Free Standing Equipment: Level and anchor unit to floor.
- B. Wall Mounted Equipment level and surface mount to wall per manufacturer's instructions.
- C. Identify components according to Division 16 Section "Basic Electrical Materials and Methods".

3.3 Wiring to Remote Components.

- A. Match type and number of cables and conductors to control and communications requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

3.4 Connections.

- A. Ground equipment as indicated and as required by NFPA 70.
- B. Connect power cables from both sources and load. Verify that both sources have the identical phase sequence.

3.5 FIELD QUALITY CONTROL

MANUAL TRANSFER SWITCHES

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- A. Testing: Test transfer switch products by operating them in all modes. Perform tests recommended by manufacturer under the supervision of manufacturer's factory-authorized service representative. Correct deficiencies and report results in writing. Record adjustable relay settings.
- B. Testing: Perform the following field quality control testing under the supervision of the manufacturer's factory-authorized service representative in addition to tests recommended by the manufacturer:

- 1. Before energizing equipment, after transfer switch products have been installed:
 - a. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Meet manufacturer's specified minimum resistance.
 - b. Check for electrical continuity of circuits and for short circuits.
 - c. Inspect for physical damage; proper installation and connection; and integrity of barriers, covers, and safety features.
 - d. Perform manual transfer operation.
- 2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to manual transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Perform contact resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.

- C. Coordinate tests with tests of generator plant and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 Demonstration

- A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain manual switches and related equipment as specified below:
 - 1. Coordinate this training with that for generator equipment.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Training of Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing and maintaining equipment shall be provided.
3. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout" and "Operation and Maintenance Data".
4. Provide a minimum of two hours of instruction.

END OF SECTION 16415

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 16470
PANEL BOARDS****PART 1 - GENERAL****1.1 SCOPE OF WORK**

- A. The Contractor shall furnish materials and labor to energize the existing panel boards as specified and as shown on the contract drawings.

1.2 REFERENCES

- A. The panel boards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:
 - 1. UL 67 – Panel Boards
 - 2. UL 50 – Cabinets and boxes
 - 3. NEMA PB1
 - 4. Fed. Spec. W-P-115C
 - 5. Circuit Breaker – Type 1 Class 1
 - 6. Fusible switch – Type II Class 1

1.3 SUBMITTALS FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
 - 1. Breaker layout drawing with dimensions indicated and nameplate designation.
 - 2. Component list
 - 3. Conduit entry / exit locations
 - 4. Assembly ratings including:
 - a. Short-circuit rating
 - b. Voltage
 - c. Continuous current
 - 5. Cable terminal sizes
 - 6. Product data sheets.
- B. Where applicable, the following additional information shall be submitted to the Engineer:
 - 1. Key interlock scheme drawing and sequence of operations.

1.4 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:
 - 1. Final as-built drawings and information for items listed in paragraph 1.04.
 - 2. Installation information.
 - 3. Seismic certification and equipment anchorage details.
- B. The Final (as-built) drawings shall include the same drawings as the construction drawings, and shall incorporate all changes made during the manufacturing process.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.5 QUALIFICATIONS

- A. The manufacturer of the panel board shall be the manufacturer of the major components within the assembly, including circuit breakers and fusible switches.
- 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.
- D. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) for zone 4 application. Guidelines from the installation consistent with these requirements shall be provided by the switch gear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 2.15 g's (3.2-11 Hz), and a ZPA of 0.86 g's applied at the base of the equipment. The test shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.
- E. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
 - 1. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.
 - 2. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
 - 3. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.6 REGULATORY REQUIREMENTS

- A. The panel boards shall be UL labeled.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts' lists where applicable, for the complete assembly and each major component.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 2 – PRODUCTS**2.1 MANUFACTURERS**

- A. Alan Bradley
- B. Square D Company
- C. General Electric

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.2 RATINGS

- A. Panel boards rated 240V AC or less shall have short-circuit ratings as shown on the drawings or as herein scheduled, but not less than 10,000 amperes RMS symmetrical.
- B. Panel boards rated 480V AC shall have short-circuit ratings as shown on the drawings or as herein scheduled, but not less than 14,000 amperes RMS symmetrical.
- C. Panel boards shall be labeled with a UL short-circuit rating. When series ratings are applied with integral or remote upstream devices, a label or manual shall be provided. It shall state the conditions of the UL series ratings including:
 - 1. Size and type of upstream device
 - 2. Branch devices that can be used
 - 3. UL series short-circuit rating.

2.3 CONSTRUCTION

- A. Interiors shall be completely factory assembled devices. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
- B. Trims for branch circuit panel boards shall be supplied with a hinged door over all circuit breaker handles. Doors in panel board trims shall not uncover any line parts. Doors shall have a semi flush cylinder lock and catch assembly. Doors over 48 inches in height shall have auxiliary fasteners.
- C. Distribution panel board trims shall cover all live parts. Switching device handles shall be accessible.
- D. Surface trims shall be same height and width as box. Flush trims shall overlap the box by $\frac{3}{4}$ of an inch on all sides.
- E. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door.
- F. All locks shall be keyed alike.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.4 BUS

- A. Main bus shall be copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.
- B. A system insulated, and isolated ground bus shall be included in all panels.
- C. Full-size (100%-rated) insulated neutral bars shall be included for panel boards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.

2.5 BRANCH CIRCUIT PANEL BOARDS

- A. The minimum short-circuit rating for branch circuit panel boards shall be indicated on the drawings. Panel boards shall be fully rated.
- B. Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.
- C. Circuit breakers shall be thermal-magnetic type with common type handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame and through 100-ampere trip sizes shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.
- D. Circuit breakers shall have a minimum interrupting rating of 10,000 amperes symmetrical at 240 volts, and 14,000 amperes symmetrical at 480 volts, unless otherwise noted on the drawings.

2.6 DISTRIBUTION PANELBOARDS – CIRCUIT BREAKER TYPE

- A. Distribution panel boards with bolt-on devices contained therein shall have interrupting ratings as indicated on the drawings. Panel boards shall be fully rated. Panel boards shall have molded case circuit breakers as indicated below.
- B. Distribution panel boards with plug-on devices contained therein shall have interrupting ratings as indicated on the drawings. Panel boards shall be fully rated. Panel boards shall have molded case circuit breakers permanently affixed to plug-on breaker adapter, as indicated below.
- C. Where indicated, provide circuit breaker for application at 100% of their continuous ampere rating in their intended enclosure.
- D. Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

2.7 MAIN AND FEEDER PROTECTIVE DEVICES**2.8 TRIP UNITS**

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.9 DISTRIBUTION PANEL BOARDS – FUSIBLE SWITCH TYPE

- A. Distribution panel boards shall have fusible switches as specified below and include fuses with ratings indicated on the drawings.

2.10 MAIN AND FEEDER PROTECTOR DEVICES**2.11 Not Used****2.12 TRANSIENT VOLTAGE SURGE SUPPRESSION**

- A. Provide transient voltage surge protection as specified in Section 16671.

2.13 ENCLOSURE

- A. Enclosures shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

2.14 NAMEPLATES

- A. Provide an engraved nameplate for each panel section.

2.15 FINISH

- A. Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied.

PART 3 – EXECUTION**3.1 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 NEMA and UL standards.

3.2 INSTALLATION

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawing.

END OF SECTION 16470

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 16950
ELECTRICAL TESTING****PART 1 - GENERAL****1.1 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

1.2 SUBMITTALS

- A. Administrative Submittals: Submit 10 days prior to performing inspections or tests:
 - 1. Schedule for performing inspection and tests.
 - 2. List of references to be used for each test.
 - 3. Sample copy of equipment, materials specifications and forms.
 - 4. Sample copy of individual device test form.
 - 5. Sample copy of individual system test form.
- B. Quality Control Submittals: Submit within 30 days after completion of test:
 - 1. Test or inspection reports and certificates for each electrical item tested.
- C. Contract Closeout Submittals:
 - 1. Operation and maintenance data.
 - 2. After test or inspection reports and certificates have been reviewed by the ENGINEER and returned, insert a copy of each in the operation and maintenance manual.

1.3 SEQUENCING AND SCHEDULING

- A. Perform inspection and electrical tests after equipment has been installed.
- B. Perform tests with apparatus de-energized whenever feasible.
- C. Inspection and electrical tests on energized equipment shall be:
 - 1. Scheduled with the ENGINEER and OWNER prior to de-energization.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Notify ENGINEER and OWNER at least 24 hours prior to performing tests on electrical equipment.
3. Schedule and coordinate all required manufacturer's representatives.

1.4 SPECIFIC TESTS**A. Conductors 600 volts or less:**

1. Perform insulation resistance testing of all power circuits below 600 volts with a 1000 Volt Megger.
2. Prepare a written test report of the results and submit to Engineer prior to final inspection.
3. Minimum acceptable value for insulation resistance is 1 megohm.
4. Disconnect equipment that might be damaged by this test. Perform tests with all other equipment connected to the circuit.
5. As part of final completion, and before schedule for substantial completion, contractor shall test all panels' feeder connections, incoming main feed locks, splices, and connections with infrared temperature sensing device to ensure all materials are not defective and all joints are tight.

B. Grounding systems

1. Fall-of-Potential Test:
 - a. In accordance with IEEE 81, Section 8.2.1.5 for the measurement of the main systems ground resistance.
 - b. Main ground electrode system resistance to ground to be no greater than 5 ohms.
2. Two-Point Direct Method Test:
 - a. In accordance with IEEE 81, Section 8.2.1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.
 - b. Equipment ground resistance shall not exceed main grounding resistance by 0.50 ohm.
3. Control wiring test:
 - a. Apply secondary voltage to control power and potential circuits.
 - b. Check voltage levels at each point on terminal boards and each device terminal.
 - c. Insulation resistance test at 1,000 volts dc on control wiring except that connected to solid state components. Insulation resistance to be 1 megohm minimum.
4. Operational test by initiating control devices to affect proper operation.

END OF SECTION 16950

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 16960
LIFT STATION CONTROL CABINET****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. The Control Diagrams and One-Line Diagrams and these Specifications depict the minimum functional requirements of the control system provided under this Section. The pump system's supplier shall provide all materials and controls necessary to provide a safe and operable system at all Pump Stations. The specific control system proposed shall be subject to the approval of the ENGINEER. The Radio Telemetry System Components discussed in this Section are to be provided by the Contractor.
- B. This Specification document is general to all Pump Stations; refer to Control Diagrams and One-Line Diagrams for specific details to an individual Pump Station. Control Diagrams supersede the general requirements of this document.
- C. See Section 01001, General Requirements, and Section 16050 Basic Electrical Materials and Methods. Refer to min Bill of Materials on Drawings.
- D. All discrete input and output signals of the control panels to/from devices external to this pump package shall be isolated normally OPEN contact closures rated for 10 amps, 120V ac continuous service.
- E. All panel construction shall be completed in UL 508 Panel Fabricator Shop and be UL 508 labeled. Panel shall also be UL labeled as Service Entrance Equipment.

1.02 SUBMITTALS

- A. Comply with Section 01300, Submittals, Division 16 Electrical.
- B. Provide complete and detailed manufacturer's and pump system supplier's descriptive information and integrated shop drawings on the following items proposed for each pump station:
 - 1. Wiring and control ladder diagram.
 - 2. Interconnection diagram.
 - 3. Enclosure shop drawing.
 - 4. Power supply.
 - 5. Terminal blocks.
 - 6. Control relays.
 - 7. Electrical transient protection.
 - 8. Alarm lights.
 - 9. Pushbutton, indicating lights and selection switches.
 - 10. Elapsed time meters
 - 11. Programmable controller.
 - 12. Motor starters.

LIFT STATION CONTROL CABINET

94066-1224
EXHIBIT 4
16960

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

13. Dry type transformers.
 14. Level control system including level indicator/controller, and all associated equipment, piping, valves, and fittings.
 15. Circuit breaker and interlocks.
 16. Instrumentation system schematic.
 17. Special mechanical and electrical features (e.g., power cables, etc.) required for pump systems to meet Class I, Division 2 requirements.
 18. Enclosures.
 19. Conduit and Pull Box Schematic Drawings.
- C. Incomplete submittals by the pump system's supplier (e.g., catalog cuts with no integrated or coordinated drawing depicting equipment function or operation) will be returned without action.

PART 2 PRODUCTS**2.01 CONTROL CABINET****A. Pre-Qualified Manufacturers**

- 1) Champion Controls
- 2) Hall Fountains
- 3) Atlantic Enviromental
- 4) Or other Pre-Qualified panel manufacturers that successfully completed Bid 422-11000, and offer local support (Dade, Broward, or Palm Beach County) for their products will be considered as control Panel manufacturer.

A.B. The Control Panel Shall Include:

1. A main circuit breaker and an Emergency Power Circuit Breaker.
2. Individual motor circuit breaker(s).
3. A combination motor starter for each motor.
4. Terminal blocks for all incoming or outgoing conductors.
5. All identified and necessary operator interface devices.
6. Control hardware.
7. UPS for control functions
8. All necessary control and time delay relays
9. All necessary alarms, fuses, control power transformer, circuit breakers and other miscellaneous items necessary to fulfill the functions described or required in this and other applicable sections of these Specifications. Specific station components are to be supply as per station Drawings.
10. 24 v power supply
11. Each combination motor starter shall be separated from the rest of the panel by a metal or insulating barrier.
12. Other electrical equipment shall be as specified on Drawings.
13. Provide volatile corrosion inhibiting capsules in each control panel to protect all exposed metal surfaces for a period of at least 2 years.
14. Generator receptacle and interlock lockout to prevent operation of main power, normal power, and emergency main.

LIFT STATION CONTROL CABINET

94066-1224
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

B.C. Control cabinet fabrication, electrical components and wiring, and workmanship shall conform to the following requirements:

1. Control cabinet shall be manufactured from either Type 316 stainless steel or grey powder painted steel, refer to specific station drawings for selection, with an internal framework as required for equipment support and panel bracing. The internal framework shall permit panel lifting without racking or distortion. The control cabinet shall be a NEMA 3R rated corrosion-resistant enclosure.
2. Deadfront door in the enclosure to be fabricated of marine grade aluminum.
3. All doors shall be rubber-gasketed with continuous hinge and a 3-point latch or as specified on Drawings. A suitably sized Type 316L stainless steel hasp and staple shall be mounted on the cabinet for pad locking of the enclosure.
4. Circuit breaker handles shall extend through deadfront and control devices shall be mounted on a swingout inner door providing dead front construction of all internal wiring.
5. Provide a hand switch controlled F20 T8, fluorescent light centered in the panel and a G.F.I. protected 120-volt, 15-amp duplex receptacle within the panel as specified on Drawings
6. Power Supply:
 - a. The power supply to the panel will be a 240-480-volt, 1 or 3-phase, 60-Hz service entrance from the utility, unless refer to otherwise shown on the Drawings for actual station FPL power. Interceptor capacity to be 22,000 amps minimum, size to actual available fault current.
 - b. When specified a A generator receptacle shall be mounted on the side of the control cabinet to provide for connection of a 480-volt, 3-phase, 60-Hz generator for standby power, unless otherwise shown on the Drawings. Receptacle shall match Owner's existing requirements and the requirements of this Section.
7. Power Distribution Within Cabinets:
 - a. Provide a main circuit breaker for service entrance from the utility and a circuit breaker for the circuit from the generator breaker. Circuit breakers shall be mechanically interlocked by an externally mounted mechanism so that only one breaker can be closed at a time.
 - b. Provide a circuit breaker on each individual circuit distributed from the cabinet. The circuit breakers shall be grouped on a single subpanel. Provide subpanel placement so that there is a clear view of and access to the breakers when the exterior door is open. Circuit breakers shall meet specifications for circuit breakers elsewhere in this Section.
 - c. Power wiring shall be distributed using power distribution terminal blocks; leap frogging will not be acceptable.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

8. Wiring:
 - a. All electrical wiring shall be in accordance with the applicable requirements of Paragraph Conductors. Wires shall be 600-volt class, PVC insulated stranded copper and shall be of the sizes required for the current to be carried, as specified on Drawings. but not below 14 AWG enclosed in either sheet metal raceway or plastic wiring duct.
 - b. All interconnecting wires between panel mounted equipment and external equipment shall be terminated at numbered terminal blocks. All wires shall be identified with shrink sleeve markers using machine written lettering.
 - c. Panel shall be supplied with an UL 508, enclosed industrial control panel, label and also be UL listed as Service Entrance Equipment.
9. Terminal Blocks:
 - a. Terminal blocks shall be one-piece molded plastic blocks with screw type terminals and barriers rated for 300 volts. Terminals shall be double-sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, clearly visible with the protective cover removed.
 - b. Wires shall be terminated at the terminal blocks with crimp type, preinsulated, fork-tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the wires terminated.
10. Relays:
 - a. Control circuit switching shall be accomplished with relays. These relays, for interfacing and control applications, shall be the compact general-purpose plug-in type having low coil inrush and holding current characteristics. Contact arrangements shall be as noted or shown, and shall be rated for not less than 10 amperes at 120V ac or 28V dc. Non latching relays shall have a single coil. Latching relays shall have two coils, unlatching being accomplished by energizing one coil, and latching being accomplished by energizing the other coil. Relays shall have plain plastic dust covers, test buttons, and mounting sockets with screw terminals and hold down springs. as shown on Drawings.
 - b. Time Delay Functions:
 - 1) Shall be accomplished with time delay relays. Units shall be adjustable time delay relays with the number of contacts and contact arrangements as shown. Contacts shall be rated for 10 amperes at 120V ac. Integral knob with calibrated scale shall be provided for adjustment of time delay. Initial setting shall be as shown with time delay range approximately three times the initial setting. Time delay rangeability shall be at least 10 to 1. Operating voltage shall be 150V ac, plus 10 percent, -15 percent at 60-Hz. Operating temperature shall be -20 degrees F to 165 degrees F. Repeat timing accuracy shall be plus or minus 10 percent over the operating range. Units shown on Drawings.
 - c.b. All relays shall have a screw terminal interface with the wiring. Terminals shall have a permanent, legible identification. Relays shall

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

be mounted such that the terminal identifications are clearly visible and the terminals are readily accessible.

11. Nameplates:
 - a. Nameplates shall be engraved, rigid, laminated plastic type with adhesive back. Color shall be black with white letters and letter height shall be 3/16 inch.
 - b. Control devices for each motor shall be identified on the dead front swing out panel.
 - c. Panel shall be provided with a face mounted laminated nameplate as specified above. Color shall be black with white letters 1/2-inch high.
12. Electrical Power and Control Wiring:
 - a. Wiring in control panels shall be restrained by plastic ties or ducts. Hinge wiring shall be secured at each end so that any bending or twisting will be around the longitudinal axis of the wire and the bend area shall be protected with a sleeve.
 - b. Arrange wiring neatly, cut to proper length, cut to fit from terminal to terminal and remove surplus wire, don't leave extra wire inside wire ways.. Provide abrasion protection for any wire bundles which pass through holes or across edges of sheet metal.
 - c. Use manufacturer's recommended tool with the proper sized anvil, for all crimp terminations. No more than two wires may be terminated in a single crimp lug and no more than two lugs may be installed on a single screw terminal.
 - d. Wiring shall not be spliced or tapped except at device terminals or terminal blocks.
13. Electrical Transient Protection:
 - a. Panels shall be equipped with suitable surge-arresting devices to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby electrical devices. Protective devices used on 120V ac inputs shall be secondary valve surge protectors conforming to the requirements of IEEE Standard 28-1972 (ANSI C62.1-1971). Provide analogs and signal surge protection for all analog signals.
 - b. Manufacturers: As shown on Drawings.
14. Thermal and moisture protector monitoring relay; install and wire any required protector monitoring relay provided by pump manufacturer.
15. Wet Well Level Responsive Automatic Pump and Alarm Control System: An automatic pump control system shall operate the pumps in accordance with variations in the wet well liquid level. The automatic control system shall employ a pressure transmitter.
16. Bubbler Level Monitoring System
 - a. Bubbler Pump System:
 - 1) Pump power: 115 VAC 60 Hz.
 - 2) Measuring range: as noted in the Drawings.
 - 3) Manufacturers: As shown on Drawings.
 - b. Level Transmitter:
 - 1) Input: Pressure from bubbler system.
 - 2) Output: 4-20mA, loop powered.
 - 3) Measuring range: as noted in the drawings.
 - 4) Manufacturer: As shown on Drawings.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- c. Bubbler system power to be a separate, rail-mount (DIN, non-GFCI outlet, As shown on Drawings.
- 17. Uninterruptible Power Supply
 - a. As shown on Drawings
- 18. Low Voltage Power Supply
 - a. 50 watts or 100 watts, as shown on Drawings; 24-28 volts
 - b. DIN Rail Mount
- 19. Float Level Switch
 - a. Type
 - 1) Ball float switch, mercury free.
 - b. Functional/Performance
 - 1) Differential - Less than one inch.
 - 2) Switch Rating - 20 Amps at 120 VAC, 10 Amps at 240 VAC.
 - 3) Form C.
 - c. Physical
 - 1) Float - Type 316 stainless steel.
 - 2) Switch - Totally encapsulated mercury-free switch.
 - 3) Cable - Heavy duty, PVC jacketed, integral to float.
 - d. Options/Accessories Required
 - 1) Provide Type 316 stainless steel adjustable clamp tubes, pipe brackets and U-bolts.
 - 2) The floats shall be mounted on a vertical 1-in stainless steel pipe with all stainless steel hardware.
 - 3) The lead wire shall be a waterproof cable of sufficient length to reach panel so that no splice or junction box is required in the wet well.
 - e. Manufacturers
 - 1) Flygt, ENM-10
 - 2) Peabody Barnes, 73612XF
 - 3) Or approved equal
- 20. Liquid Level Pump/Controller:
 - a. The system shall sense the station wet well level over a calibrated range, display it on a 4-inch LED bar graph on the face of the controller, graphically display eight-level adjustment for automatic pump and alarm control in a coordinated arrangement with the level display and provide automatic operation of the station pumps and alarms as hereinafter or otherwise described.
 - b. The control system and control system program shall be built according with the drawings, be completely functional and include not less than the following features:
 - 1) Controller and transducer to be integrated standard products of experienced manufacturers.
 - 2) Zero to 23 feet wet well level range.
 - 3) Forty segment LED bar graph level display.
 - 4) Forty level adjustability of each of 8 control levels.
 - 5) Solid state automatic pump alternation on successive starts.
 - 6) Three-position auto alternator override switch (1-2, auto, 2-1) to provide fixed pump sequences as well as auto.
 - 7) "Raise-auto-lower" level simulation switch with spring return to "auto."

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- 8) "Pump down" control with four level settings for two pump controls.
 - 9) Full range adjustable dual settings for each control and alarm circuit.
 - 10)2) LED indicator for each control and alarm circuit.
 - 11) Power-up "wake-up" with pumps and alarms off; held for 18 seconds.
 - 12)3) Ten-second time interval after one pump starts before another pump is allowed to start.
 - 13) Rate of change limiting of analog level signal.
 - 14)4) 120V ac power supply fused in controller.
 - 15)5) Power line transient protection for control system. Surge protection unit shall be Sola, Model STV25K.
 - 16)6) Ten-amp, 250V ac rated control and alarm contacts.
 - 17)7) Terminal blocks and power components UL 508 recognized.
 - 18) Built in alarm silencing button and logic.
 - 19) External silencing button circuit.
 - 20)8) Form C SPDT alarm relay contacts.
 - 21)9) High and low level alarm sensing.
 - 22)10) Drive circuit for optional solid state audible.
 - 23)11) UL listed barrier/clamp type rear terminal block to accept two AWG No. 12 per panel.
 - 24)12) Extractor type fuse block, rear accessible.
 - 25)13) Complete factory standard system.
 - 26)14) One year factory warranty on parts and labor.
- c. Testing
- d.1) The Control Panel shall be delivered for testing and it must adhere to the selected components parts, materials and manufacturers listed on bill of materials of the drawings; no equals or substitutes will be accepted.
 - e.2) Control Panel must be constructed using the layout, component placement, wiring, wire terminations, wire coding, wire coloring and functionality as they are drawn in the Panel Drawings and Schematics provided.
 - f.3) Upon completion of construction, Panel Fabricator will notify the designated City representative to schedule the delivery of the finished product to the City of Fort Lauderdale at 4250 N.W. 10TH Avenue for testing and evaluation. Testing will be comprised of functionality, workmanship and the ability of the contractor to build product from Owner 's Drawings and Schematics.
 - 4) The Owner will be responsible for loading the program into the PLC for testing. Any and all programs utilized by the Owner are considered proprietary and the sole property of the Owner. The Owner and/or ENGINEER designee will have the sole and complete authority over the evaluation and testing process. During testing and evaluation any punch list items must be resolved before product will be accepted.
 - 5) It will be the contractor's responsibility to make any necessary changes at his or her facility and schedule product to be retested at no additional cost to the OWNER.

LIFT STATION CONTROL CABINET

94066-1227
 16960
 EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- g.d. An inner door mounted ground fault interrupter (GFI) type convenience receptacle rated at 20 amperes shall be supplied for the operating of trouble lights, drill, etc. It shall be protected by a separate 20-ampere trip rated circuit breaker, Square D, FAL frameAs shown on Drawings.
- h. Controller shall be Allen-Bradley Micrologix 1100 with the following characteristics and appurtenances:
 - 1) 10 - 24 v digital inputs
 - 2) 2 - 10 v analog inputs
- 3)e. 6 – digital relay output as shown on drawings.s
 - 1) Operator Interface Panel
 - 4)a) Ethernet, RS-232 and Modular Communications Interface
 - a)b) Greyscale or color touch screen
 - b)c) DC input
 - c)d) Allen-Bradley PanelView Plus 400 keypad/interfaceas shown on drawings
 - 5) RS Logix 500 software and license
 - 6) RS View Studio software and license.
- 21. For Class I, Division 2 areas, utilize "EYSR" split case fittings as manufactured by Crouse-Hinds.

2.02 RADIO TELEMETRY AND SCADA SYSTEM COMPONENTS

- A. Provide as specified on Drawings.
- B. Furnish and install the appropriate number and type of dry contacts to accommodate the telemetry system.
- C. Furnish and install all other interface wiring, terminals, circuit breakers, etc., required to interface and power the telemetry unit from the control panel.
- D. All appropriate space (e.g., blanks in panels, etc.) within the control cabinet for telemetry related accessories. See Drawings.
- E. The Owner may require coordination with their SCADA Contractor during the course of construction. This contractor shall provide coordination at no extra cost to the Owner.

2.03 ALARM LIGHT

- A. Alarm light shall be flashing or revolving light type units that produce 360-degree beams of colored light. Flashing rate shall be 60 to 80 flashes per minute. Panel mounted beacons shall consist of one RED for the High Level alarm. Beacon shall operate at 120V ac. Light should be powered by UPS
- B. Housing shall be weatherproof, suitable for use in severe outdoor environments without other protection. Light should be installed outside station, visible for outgoing traffic as per Drawings
- C. Unit shall be:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. As specified on Drawings.
- 2.04 PUSHBUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES
 - A. As specified on Drawings.
 - 2.05 GENERATOR RECEPTACLE (POWER)
 - A. Provide heavy-duty, circuit-breaking, pin-and-sleeve male receptacle assemblies, for installation at each new lift station control cabinet, consisting of a 600V ac, 3-wire, 4-pole (fourth pole for ground) weatherproof receptacle, angle adapter, and back box. Receptacles shall have ground wire terminators and contacts, crimp/solder or mechanical type contacts and cast, weatherproof angle adapters and back boxes. Provide an additional matching 50-foot cord only if a generator is being supplied with this contract. Coordinate with existing generator sets for plugs and cord caps. Provide other, equal generator receptacles should the Owner change manufacturers. As shown on Drawings See specification Drawings for details.
 - 2.06 TERMINAL BLOCKS 0 TO 600 VOLTS
 - A. As specified on Drawings.
 - 2.07 ELAPSED TIME METERS
 - A. As specified on Drawings.
 - 2.08 MOTOR STARTERS
 - A. Provide each motor with a suitable controller with thermal overload protection meeting ICS 2, Class A, NEC, and UL. Provide controller-mounted overload relays of the manually reset type. Select and install overload relay heaters after the actual nameplate full-load current rating of the motor has been determined.
 - B. Motor starters size, manufacturer and other specifications shall be as specified on Drawings.
 - 2.09 CURRENT TRANSFORMERS
 - A. As specified on Drawings.
 - A.B. Current Transformer Ratio shall be coordinated with the actual current of the installed motor.
 - B.C. Installed on one phase of the motor leads to proportionately convert motor amperage to a readable 4 to 20 mA signal. Provide isolation as necessary.
 - C.D. Manufacturers: Rochester Instruments; or equal.

LIFT STATION CONTROL CABINET

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.10 DRY TYPE TRANSFORMERS (0 TO 600 VOLTS)

- A. Materials: Provide self-cooled, two-winding, UL listed, dry type transformers of the ratings indicated and built-in accordance with the latest IEEE, UL, ANSI, and NEMA standards. Utilize units with manufacturer's standard insulation class and standard temperature rise. For ratings 0 to 25 kVA, provide units with core and coils completely enclosed in a non-ventilated, weatherproof enclosure. Utilize encapsulated windings on single-phase units 0 to 25 kVA.
- B. Manufacturers: As shown on Drawings.

2.11 INTRINSIC SAFETY BARRIERS

- A. Intrinsic safety barriers shall provide a safe energy level for exposed wiring in a Class I, Division I, Group D area when the circuit in the nonhazardous area is connected to a nominal 24V dc source, maximum 28V dc with not more than 250V available under fault conditions. The circuit in the hazardous area shall be a contact closure. The entire circuit shall be floating with a negative signal common ground. The intrinsic safety barrier shall be rated 50 mA, minimum. Intrinsic safety barriers shall be mounted in boxes in such a manner as to make separation of hazardous and nonhazardous wiring convenient. The box shall have the words "Intrinsically Safety Circuit" on the lid. Intrinsic safety barriers shall be by R. Stahl, or MTL.
- B. Intrinsic safety barriers shall be used for float signal, thermal switch, and moisture sensor circuits.

2.12 CIRCUIT BREAKERS

- A. As specified on Drawings.
- B. Mechanical Interlocks: Furnish externally mounted mechanical interlocks as indicated on the Drawings.

2.13 PHASE MONITORING RELAY

- A. Provide phase monitoring relay having 10,000-volt transient protection to protect against single-phase voltage and incorrect phase rotation. Phase monitors shall be as specified on Drawings.

2.14 CONDUCTORS

- A. General: The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the General Conditions. Unless otherwise noted by Owner
- B. Conductors:
 - 1. As specified in Section 16120 "Conductors",

LIFT STATION CONTROL CABINET

94066-1240
EXHIBIT 4

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Tag control conductors with an identification system consisting of the terminal numbers of the major equipment and instruments as indicated on the wiring diagrams furnished with the equipment.

2.15 LINE REACTORS

- A. Provide line reactors ahead of pump drives when power when power quality is suspect or when harmonic distortions are introduced.
 1. Whenever variable frequency drives are used
 2. As shown on the Drawings
- B. Line reactors shall match the specific pump supplied.
- C. Line reactors shall be as shown on Drawings.

2.16 SPARE PARTS

- A. General:
 1. For each station, provide the following spare parts for the lift station control cabinet in addition to other manufacturer recommended spare parts:
 - a. One relay and base.
 - b. One set of overload heaters.
 - c.b. One phase monitor.
 - d. One alternator.
 - e.c. One of each size control fuse.
 - f.d. One pump control module (Programmable Logic Controller, PLC and OIMOperator Interface Panel, OIP) furnished for each pump station.

PART 3 EXECUTION

3.01 TRANSFORMER

- A. Preferred installation is for the main transformer shall to be outside the main panel.
- B. Located in a separate NEMA 3R enclosure properly bonded and grounded. Provide sufficient space for cooling and ventilation.

3.02 INSTALLATION OF CONTROL PANEL

- A. The control panel is a NEMA 3R, Type 316 stainless steel or steel gray painted, ventilated enclosure. Mount as shown on the Drawings.
- B. All conduits shall be SCH 80 PVC
- B.C. All conduits shall enter the control panel from the bottom. Where split seal-offs are used with PVC coated conduits, remove the coating from the conduit section where the seal-off will be mounted. After mounting, re-coat the conduit and the seal-off using the manufacturers recommended kit.

LIFT STATION CONTROL CABINET

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C.D. Locate the generator receptacle where it will be accessible for a portable generator connection. See Drawings for site plan details.
- D.E. Field panel and concrete slab to be able to withstand 140 mph wind loading, provide Owners with wind load calculation report.. Provide mounting to slab in accordance with manufacturers recommendations.
- E.F. Stub 2-inch conduit 5 feet into unpaved area, cap and identify location on Record Drawings.
- G. Bond panel(s) to grounding loop and comply with the provisions of Section 16450, Grounding.. Provide grounding test report to Owner.
- H. Run $\frac{3}{4}$ PVC conduit for phone line connection from Control Panel to phone utility box.
- I. Run $\frac{3}{4}$ PVC conduit for water pressure device from Control panel to utility water tap.
- F.J. Run $\frac{3}{4}$ PVC conduit for Force Main Pressure from Control Panel to force main line as per drawings and when applicable.

END OF SECTION

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 260500
BASIC ELECTRICAL MATERIAL AND METHODS****PART 1 GENERAL****1.1 SCOPE OF WORK**

- A. Furnish all materials, labor, equipment and incidentals required to supply power to Lift Station, A-12. The scope of the work, per drawing and specification, includes, but is not limited to the following:
1. Installation of new FPL service, from FPL service pull box to power main breaker.
 2. Furnish and install, Automatic Transfer Switch (ATS), power distribution panels, step-down transformer, control panel, service disconnect and wiring to pumps
- B. The work, apparatus and materials which shall be furnished under these Specifications and accompanying Drawings shall include all items listed hereinafter and/or shown on the Drawings. Certain equipment which will require wiring thereto and/or complete installation is indicated. All materials necessary for the complete installation shall be furnished and installed by the CONTRACTOR to provide complete power, lighting, wiring and control systems as indicated on the Drawings and/or as specified herein.
- C. The CONTRACTOR shall furnish and install the necessary cables, protective devices, conductors, supports, raceways, exterior electrical system as indicated on the Drawings and/or as specified.
- D. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; sub-standard work will be rejected.
- E. Each bidder or his authorized representatives shall, before preparing his proposal, visit all areas of the existing buildings and structures in which work under this Section is to be performed and inspect carefully the present installation. The submission of the proposal by this bidder shall be considered evidence that he or his representative has visited the buildings and noted the locations and conditions under which the work will be performed and that he takes full responsibility for a complete knowledge of all factors governing his work.
- F. All power interruptions to existing equipment shall be at the OWNER's convenience. Each interruption shall have prior approval.
- G.. It is the intent of these Specifications that the electrical system shall be suitable in every way for the service required. All material and all work which may be reasonably implied as being incidental to the work of this Section shall be furnished at no extra cost.
- H. Furnish and install a complete underground system of ducts, manholes and handholes as herein specified and shown on the drawings.

PROJECT 11766**1.2 SERVICE AND METERING**

- A. Permanent electrical power will be provided by the Florida Power & Light (FPL) at voltages indicated on the drawings.

1.3 CODES, INSPECTION AND FEES

- A. All material and installation shall be in accordance with the latest edition of the National Electrical Code and all applicable national, local and state codes, laws and ordinances.
- B. Pay all fees required for permits and inspections.

1.4 TESTS

- A. Test all systems and repair or replace all defective work. Make all necessary adjustments to the systems and instruct the OWNER's personnel in the proper operation of the systems.
- B. The following minimum tests and checks shall be made prior to the energizing of electrical equipment. Test shall be by the CONTRACTOR and a certified test report shall be submitted providing all test results and stating that the equipment meets and operates in accordance with the Manufacturer's and job specifications, and that equipment and installation conforms to all applicable Standards and Specifications.
 - 1. Testing all 600 volt wire insulation with a megohm meter after installation. Make tests at not less than 1000 volts. Submit a written test report of the results to the engineer.
 - 2. Mechanical inspection of all circuit breakers to assure proper operation.
- C. The Engineer shall be notified forty-eight (48) hours before tests are made to enable the Owner to have designated personnel present.

1.5 INTERPRETATION OF DRAWING

- A. The Drawings are not intended to show exact locations of conduit runs.
- B. All three –phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.
- C. Unless otherwise approved by the Engineer, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.
- D. Where circuits are shown as “home-runs,” all necessary fittings and boxes shall be provided for a complete raceway installation.
- E. All necessary offsets shall be furnished so as to take up a minimum space and all such offsets, fittings, etc., required to accomplish this shall be furnished and installed by the CONTRACTOR without additional expense to the Owner. In case interference

PROJECT 11766

develops, the Owner's authorized representative is to decide which equipment, piping, etc., must be relocated, regardless of which was installed first

- F. Verify with the Engineer the exact locations and mounting heights of equipment, prior to installation.
- G. The locations of equipment shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- H. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.
- I. Circuit layouts shown are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all electrical systems shown. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.
- J. All connections to equipment shall be made as shown, specified and directed and in accordance with the approved shop drawings, regardless of the number of conductors shown on the Electrical Drawings

1.6 SIZE OF EQUIPMENT

- A. The equipment shall be kept upright at all times. When equipment has to be tilted for ease of passage through restricted areas during transportation, the Manufacturer shall be required to brace the equipment suitably, to insure that the tilting does not impair the functional integrity of the equipment.

1.7 RECORD DRAWINGS

- A. As the work progresses, legibly record all field changes on a set of project Contract Drawings. When the project is complete, furnish a complete set of reproducible "As-built" drawings for the Project Record Documents.

1.8 COMPONENT INTERCONNECTIONS

- A. Component equipment furnished under this Specification will not be furnished as integrated systems. .
- B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.

1.9 SHOP DRAWINGS

- A. As specified under other Sections, shop drawings shall be submitted for approval for all materials, equipment, apparatus, and other items as required by the Engineer.
- B. Shop drawings shall be submitted for the following equipment

PROJECT 11766

1. 240-Volt Panelboard Disconnect switch.
 2. Meter Can
 3. Pedestrian fixtures and poles
 4. Wire & cable
 5. Conduit
 6. Lighting contactor
- C. The Manufacturer's name and product designation and catalog cutsheets shall be submitted for the following materials:
1. Conduit
 2. Receptacles
 3. Boxes and fittings
- D. Prior to submittal by the CONTRACTOR, all shop drawings shall be checked for accuracy and contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to Specifications and Drawings. This statement shall also list all discrepancies with the Specifications and Drawings. Shop drawings not so checked and noted shall be returned.
- E. The Engineer's check shall be only for conformance with the design concept of the project and compliance with the Specifications and Drawings. The responsibility of, or the necessity of, furnishing materials and workmanship required by the Specifications and Drawings which may not be indicated on the shop drawings is included under the work of this Section.
- F. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this Section.
- G. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.

1.10 WARRANTY

- A. Provide a warranty for all the electrical equipment in accordance with the requirements of other Sections. Under no circumstances shall the warranty be for less than one year starting from substantial completion.

PART 2 PRODUCTS**2.1 GENERAL**

- A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials where not specified shall be of the very best of their respective kinds. Samples of materials of Manufacturer's specifications shall be submitted for approval as required by the Engineer.
- B. Materials and equipment used shall be Underwriters Laboratories, Inc. listed and conform with applicable standards of NEMA and ANSI.

PROJECT 11766

- C. Electrical equipment shall, at all times during construction, be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of-doors. Electrical equipment shall be stored in dry permanent shelters. If any apparatus has been damaged, such damage shall be repaired by the CONTRACTOR at his expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the cost and expense of the CONTRACT, or shall be replaced by the CONTRACTOR at his own expense.
- D. All electrical panels, enclosures, raceways, conduits, wireways, boxes, cabinets, etc., shall be fabricated of metal. Nonmetallic substitutes are not acceptable. This does not apply to buried work.

2.2 RACEWAYS AND FITTINGS

- A. Furnish and install complete raceway systems as shown on the Drawings and as specified herein.
- B. All conduit of a given type shall be the product of one manufacturer.
- C. All conduit shall be Rigid Nonmetallic Conduit Schedule 40 PVC.
 - 1. Rigid nonmetallic conduit shall be for use under the provisions of NEC Article 347.
 - 2. PVC conduit shall be rigid polyvinyl chloride schedule 40 as manufactured by Carlon, An Indian Head Co., Kraloy Products Co., Inc., Highland Plastics Inc., or approved equal.

2.3 CONDUCTORS

- A. Conductors shall be copper. Power circuits shall have 600 volt PVC insulations (Underwriters' approval Type THNN/THWN). Conductors shall be color coded in accordance with the NEC.
- B. All wires and cables shall be of annealed, 98 percent conductivity, soft drawn stranded copper conductors.
- C. Type THNN/THWN shall be as manufactured by the Southwire Co., Collyer Insulated Wire Co., Rome Cable or approved equal.

2.4 UNDERGROUND SYSTEM

- A. Materials
 - 1. Ducts shall be polyvinyl chloride (PVC Schedule 40) installed on clean fine sand. No rocks or debris shall be allowed as trench fill.
- A. Ducts shall be installed to drain away from panels; ducts between pullboxes shall drain towards the pullbox. Duct slopes shall not be less than 3 inches per 100 feet.
- B. Duct lines shall be laid in trenches on a clean backfill bedding.

PROJECT 11766

- C. The minimum cover for duct lines shall be as specified or required by NEC.
- D. PVC duct terminations at pullboxes shall be with PVC and bells.
- E. Where bends in ducts are required, long radius elbows, sweeps and offsets shall be used.
- F. Spare ducts shall be plugged and sealed watertight at all pullboxes. Sealant shall be foam type.
- G. Ducts in use shall be sealed watertight at all pullboxes. Sealant shall be foam type.
- H. All joints shall be made so as to prevent the passage of concrete inside the conduit to form obstructions or cause cable abrasions.
- I. A 5/8-inch by 10-foot copperclad ground rod shall be driven in the bottom of each pullbox. All bond wires and pullbox cover shall be bonded to the ground rod.

PART 3 EXECUTION**3.1 CONDUIT INSTALLATION**

- A. Where conduits enter or leave all outlets boxes, cabinets safety switches, tap boxes, motor controllers, etc., other than those having threaded hubs, a standard lock nut shall be used on the outside of the box. Busings 1-inch and larger shall be of an approved insulated type. Unless otherwise indicated, conduit 2-inches and larger shall be supported at intervals not exceeding twelve (12) feet and for smaller sizes at intervals not exceeding eight (8) feet.
- B. During construction, all installed raceways shall be temporarily plugged or otherwise protected from the entrance of moisture, dirt, trash, plaster, moisture, etc., through neglect of the CONTRACTOR to so protect them, shall be replaced by the CONTRACTOR without additional expense to the Owner. No kinked, clogged or deformed raceways will be permitted on the job. Raceways shall be cut to proper length so that ends will fit accurately in the outlets. Where raceways cross building expansion joints, a suitable raceway expansion fitting shall be used.
- C. Size of raceway shall not be less than NEC requirements, but in no case shall be less than indicated on the Drawings. Combining of circuits, other than detailed, will not be permitted. The CONTRACTOR shall install larger size raceways than detailed where there is excessive length of unbroken run or excessive number of bends.
- D. Bends in metallic raceways shall be made while "cold" and in no case shall the raceways be heated. Raceways shall not be bent through more than 90. The radius of bends shall not be less than six (6) times the internal diameter of the raceway. Not more than four (4) (equivalent 90) bends will be permitted between outlets, the bends at the outlets being counted.
- E. Raceways shall be properly aligned, grouped and supported. Exposed raceways shall be installed at the right angles to or parallel to the principal structural members. Concealed raceways, unless otherwise indicated, may take the most direct route between outlets. Raceways shall be firmly held in place. Raceways shall run to avoid trapping wherever possible. Where areas are indicated for future openings,

PROJECT 11766

foundations, etc., all raceways shall be run around such areas. The CONTRACTOR shall provide necessary inserts in poured concrete areas and shall furnish and install all necessary sleeves through walls, floors and roofs for passage of raceways. Sleeves through roofs and/or exterior walls shall be properly sealed by the CONTRACTOR against entrance of moisture, etc., into building. Where necessary repairs to the building structure using material in no way inferior to that originally installed and using labor skilled in the trades involved.

3.2 BOXES

- A. Install all outlet boxes, tap junction or pull boxes, device boxes, etc., necessary for the complete installation as indicated on the Drawings and/or specified herein. All boxes shall be rigidly mounted and shall be equipped with suitable screw fastened covers. All raceways entering boxes shall be mechanically and electrically secure. Open knockouts or holes in boxes shall be mechanically and electrically secure. Open knockouts or holes in boxes shall be plugged with suitable blacking devices. Boxes shall be cleared of all plaster, dirt, trash, etc., before the installation of any wiring devices and/or before the installation of cover plates.
- B. All exterior pull boxes shall be precast concrete with traffic rated covers. Boxes shall be sized as per the NEC. Precast boxes shall be manufactured by Brooks Products Co., or approved equal.

3.3 TERMINATIONS & SPLICES

- A. Splices, taps and attachments of fittings and lugs shall be electrically and mechanically secure. There shall be plenty of slack cable in boxes, outlets and cabinets to insure that there is no binding at the bushings. All lugs shall be of the correct sizes for the conductor in order to fit the conductor into a lug.
- B. All wires shall be numbered indicating circuit number. Numbers shall be crimp type and installed on wire after wires enter pull box.
- C. Power Conductors: Terminations shall be die type or set screw type pressure connectors as specified. Splices (where allowed) shall be silicon filled wire nut splice, weatherproof and submergence proof, King or equal.
- D. Except where otherwise approved by the Engineer no splices will be allowed in manholes, handholes or other below grade located boxes.
- E. Splices shall not be made in conduit bodies.

3.4 GROUNDING

- A. The entire electrical system shall be completely and effectively grounded as required by the NEC and as specified hereinafter.
- A. All metallic raceways shall be mechanically and electrically secure at all joints and at all boxes, cabinets, fittings and equipment. Metallic raceway entering the motor control center control panels or other electrical boxes shall be grounded to the appropriate ground bus. All metallic raceways shall be electrically continuous throughout the entire conduit system. Bond wires shall be used in exterior concrete pull boxes.

PROJECT 11766

- B. The ground plane shall consist of a minimum of 3-5/8" x 10' copper ground rods spaces at least 10' apart. Rods and system ground shall be connected with a #1/0 copper ground to the service entrance ground. The ground resistance shall be tested and additional rods or plates added to achieve a dry season resistance not exceeding 5 ohms.

3.5 CONDUCTOR COLOR CODING

- A. All conductors shall be color coded as specified hereinafter. Color coding shall be by means of colored insulation material, colored braid or jacket over the insulations, or by means of suitable colored permanent, non-aging insulation tape equal to Scotch #471 or "Texcel 98" applied to conductors at each outlet, cabinet or junction point.

- B. The following system of color coding shall be strictly adhered to:

1. Ground leads, green.
2. Grounded neutral leads, white.
3. Ungrounded phase wire of a delta connected 120/240 volt, 3-phase, 4-wire system, black, red and blue (high leg).

Colors for 230-208 / 120v Circuits:

- a) Phase A: Black
- b) Phase B: Red
- c) Phase C: Blue

Colors for 480/ 277v Circuits:

- d) Phase A: Brown
- e) Phase B: Orange
- f) Phase C: Yellow

4. All control leads, other than line connected "hot" leads, shall be yellow, orange and brown and/or I.P.C.E.A. standard control cable coding provided method of identification is different from method used on power conductors.

- C. The color coding assigned to each phase wire shall be consistently followed throughout the Work.

3.6 SUPPORTS

- A. The CONTRACTOR shall furnish and install all necessary supports for properly mounting all electrical equipment and raceways. Such supports shall be fabricated and installed in a neat and workmanlike manner, and care shall be taken that at no time shall any portion of the building structure be overloaded. Should the building structure sustain damage through carelessness or through failure of the CONTRACTOR to properly support and install the electrical equipment, the CONTRACTOR shall bear all costs involved in repairing or replacing such installation.
- B. All steel shapes exposed to the weather shall be galvanized after all cutting, drilling, and/or welding is done. All shop connections shall be welded or riveted and all field connections shall be bolted on all outdoor structures. Where the field cutting or drilling

PROJECT 11766

of galvanized steel is necessary, the CONTRACTOR shall apply one (1) coat of priming paint and one (1) finish coat of aluminum and oil paint.

3.7 TESTS AND CHECKS

- A. The following minimum tests and checks shall be made, but prior to the termination of any field wiring.
1. Megger terminals and buses after disconnecting devices sensitive to megger voltage.
 2. A 1,000V DC megger shall be used for these tests.
 3. The first test shall be made with main circuit breaker closed and all remaining breakers open. A second test shall be made with all circuit breakers closed.
 4. The test results shall be recorded and forwarded to the Engineer for his review. Minimum megger readings shall be 100 megohms in both tests.

END OF SECTION 260500

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following:
1. Building wires and cables rated 600 V and less.
 2. Connectors, splices, and terminations rated 600 V and less.
 3. Sleeves and sleeve seals for cables.
- B. Related Sections include the following:
1. Division 26 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.
 2. Division 26 Section "Undercarpet Electrical Power Cables" for flat cables for undercarpet installations.
 3. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Alcan Products Corporation; Alcan Cable Division.
 2. American Insulated Wire Corp.; a Leviton Company.
 3. General Cable Corporation.
 4. Senator Wire & Cable Company.
 5. Southwire Company.
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN XHHW.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. AFC Cable Systems, Inc.
 2. Hubbell Power Systems, Inc.
 3. O-Z/Gedney; EGS Electrical Group LLC.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. 3M; Electrical Products Division.
 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum **0.052- or 0.138-inch (1.3- or 3.5-mm)** thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.4 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 1. Advance Products & Systems, Inc.
 2. Calpico, Inc.
 3. Metraflex Co.
 4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 1. Sealing Elements: EPDM NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 2. Pressure Plates: Carbon steel. Include two for each sealing element.
 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

PART 3 - EXECUTION**3.1 CONDUCTOR MATERIAL APPLICATIONS**

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: City will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

C. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the critical equipment and services for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.
 - 1. Overhead-lines grounding.
 - 2. Underground distribution grounding.
 - 3. Common ground bonding with lightning protection system.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Ground rings.
 - 4. Grounding arrangements and connections for separately derived systems.
 - 5. Grounding for sensitive electronic equipment.
- C. Qualification Data: For testing agency and testing agency's field supervisor.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For grounding to include the following in emergency, operation, and maintenance manuals:
 - 1. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NFPA 70B.
 - a. Tests shall be to determine if ground resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if they do not.
 - b. Include recommended testing intervals.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS**2.1 CONDUCTORS**

- A. Insulated Conductors: Copper] wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 - 1. No. 4 AWG minimum, soft-drawn copper.
 - 2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir or cypress or cedar.
- D. Grounding Bus: Rectangular bars of annealed copper, 1/4 by 2 inches (6 by 50 mm) in cross section, unless otherwise indicated; with insulators.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad 3/4 inch by 10 feet (19 mm by 3 m) in diameter.
- B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
 - 1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
 - 2. Backfill Material: Electrode manufacturer's recommended material.

PART 3 - EXECUTION**3.1 APPLICATIONS**

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches (600 mm) below grade.
 - 2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 1 inch (25 mm), minimum, from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.
- E. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.
 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- C. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- D. Concrete Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.
1. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- F. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
 2. Bury ground ring not less than 24 inches (600 mm) from building foundation.
- J. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, using a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal[, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 3. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- D. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 5 ohms.
 2. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
 5. Substations and Pad-Mounted Equipment: 5 ohms.
 6. Manhole Grounds: 10 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 260533
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
 - 2. For handholes and boxes for underground wiring, including the following:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Duct entry provisions, including locations and duct sizes.
 - b. Frame and cover design.
 - c. Grounding details.
 - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
 - e. Joint details.
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Qualification Data: For professional engineer and testing agency.
- E. Source quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 METAL CONDUIT AND TUBING**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflec Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube Company.
- C. Rigid Steel Conduit: ANSI C80.1.
- D. Aluminum Rigid Conduit: ANSI C80.5.

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. IMC: ANSI C80.6.
- F. PVC-Coated Steel Conduit: PVC-coated [**rigid steel conduit**] [**IMC**].
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: **0.040 inch (1 mm)**, minimum.
- G. EMT: ANSI C80.3.
- H. FMC: Zinc-coated steel.
- I. LFMC: Flexible steel conduit with PVC jacket.
- J. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: set-screw or compression type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, **0.040 inch (1 mm)**, with overlapping sleeves protecting threaded joints.
- K. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.; Pipe & Plastics Group.
 - 6. Condux International, Inc.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; a Hubbell Company.
 - 12. Thomas & Betts Corporation.
- C. ENT: NEMA TC 13.
- D. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- E. LFNC: UL 1660.

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- F. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- G. Fittings for LFNC: UL 514B.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 6. O-Z/Gedney; a unit of General Signal.
 - 7. RACO; a Hubbell Company.
 - 8. Robroy Industries, Inc.; Enclosure Division.
 - 9. Scott Fetzer Co.; Adalet Division.
 - 10. Spring City Electrical Manufacturing Company.
 - 11. Thomas & Betts Corporation.
 - 12. Walker Systems, Inc.; Wiremold Company (The).
 - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- C. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- D. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
 - 1. Color of Frame and Cover: Gray.
 - 2. Configuration: Units shall be designed for flush burial and have openbottom, unless otherwise indicated.
 - 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 5. Cover Legend: Molded lettering, "ELECTRIC."
 - 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 - 7. Handholes **12 inches wide by 24 inches long (300 mm wide by 600 mm long)** and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings, or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.
 - d. NewBasis.
- C. Fiberglass Handholes and Boxes with Polymer-Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester-resin enclosure joined to polymer-concrete top ring or frame.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. Christy Concrete Products.
 - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.
- D. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with covers of fiberglass.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings, or a comparable product by one of the following:
 - a. Carson Industries LLC.
 - b. Christy Concrete Products.
 - c. Nordic Fiberglass, Inc.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.5 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.6 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings, or a comparable product by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM, NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Carbon steel. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - 1. Tests of materials shall be performed by a independent testing agency.
 - 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION**3.1 RACEWAY APPLICATION**

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 1. Exposed Conduit: Rigid steel conduit, IMC, RNC, Type EPC-40-PVC.
 2. Concealed Conduit, Aboveground: Rigid steel conduit, EMT.
 3. Underground Conduit: RNC, Type EPC-40 PVC, direct buried.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC, LFNC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
 6. Application of Handholes and Boxes for Underground Wiring:
 - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Fiberglass-reinforced polyester resin, SCTE 77, Tier 15 structural load rating.
 - b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Heavy-duty fiberglass units with polymer-concrete frame and cover, SCTE 77, Tier 8 structural load rating.
 - c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with **3000-lbs (13 345-N)** vertical loading.
- B. Comply with the following indoor applications, unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: Rigid steel conduit.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic, in damp or wet locations.
- C. Minimum Raceway Size: **3/4-inch (21-mm)** trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least **6 inches (150 mm)** away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
1. Run conduit larger than **1-inch (27-mm)** trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than **200-lb (90-kg)** tensile strength. Leave at least **12 inches (300 mm)** of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 - 1. **3/4-Inch (19-mm)** Trade Size and Smaller: Install raceways in maximum lengths of **50 feet (15 m)**.
 - 2. **1-Inch (25-mm)** Trade Size and Larger: Install raceways in maximum lengths of **75 feet (23 m)**.
 - 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than **6 inches (150 mm)** in nominal diameter.
 - 2. Install backfill as specified in Division 31 Section "Earth Moving."
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within **12 inches (300 mm)** of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
 - 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
 - 5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with **3 inches (75 mm)** of concrete.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of **60 inches (1500 mm)** from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
- 6. Warning Planks: Bury warning planks approximately **12 inches (300 mm)** above direct-buried conduits, placing them **24 inches (600 mm)** o.c. Align planks along the width and along the centerline of conduit.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from **1/2-inch (12.5-mm)** sieve to **No. 4 (4.75-mm)** sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures **1 inch (25 mm)** above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.8 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Identification for raceway and metal-clad cable.
 - 2. Identification for conductors and communication and control cable.
 - 3. Underground-line warning tape.
 - 4. Warning labels and signs.
 - 5. Instruction signs.
 - 6. Equipment identification labels.
 - 7. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.
- C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS**2.1 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS**

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Color for Printed Legend:
 - 1. Power Circuits: Black letters on an orange field.
 - 2. Legend: Indicate system or service and voltage, if applicable.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- C. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- (0.35-mm-) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.
- D. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking nylon tie fastener.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- E. Write-On Tags: Polyester tag, **0.015 inch (0.38 mm)** thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 6 inches (150 mm) wide by 4 mils (0.102 mm) thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend shall indicate type of underground line.

2.4 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.
- C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).
- E. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.5 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.6 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength: 50 lb (22.6 kg), minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
- B. Paint: Paint materials and application requirements are specified in Division 09 painting Sections.
 - 1. Exterior Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):
 - a. Semigloss Acrylic-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Exterior concrete and masonry primer.
 - 2) Finish Coats: Exterior semigloss acrylic enamel.
 - 2. Exterior Concrete Unit Masonry:
 - a. Semigloss Acrylic-Enamel Finish: One finish coat(s) over a block filler.
 - 1) Block Filler: Concrete unit masonry block filler.
 - 2) Finish Coats: Exterior semigloss acrylic enamel.
 - 3. Exterior Ferrous Metal:
 - a. Semigloss Alkyd-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Exterior ferrous-metal primer.
 - 2) Finish Coats: Exterior semigloss alkyd enamel.
 - 4. Exterior Zinc-Coated Metal (except Raceways):

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- a. Semigloss Alkyd-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Exterior zinc-coated metal primer.
 - 2) Finish Coats: Exterior semigloss alkyd enamel.
- 5. Interior Concrete and Masonry (Other Than Concrete Unit Masonry):
 - a. Semigloss Alkyd-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Interior concrete and masonry primer.
 - 2) Finish Coats: Interior semigloss alkyd enamel.
- 6. Interior Concrete Unit Masonry:
 - a. Semigloss Acrylic-Enamel Finish: Two finish coats over a block filler.
 - 1) Block Filler: Concrete unit masonry block filler.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
- 7. Interior Gypsum Board:
 - a. Semigloss Acrylic-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Interior gypsum board primer.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
- 8. Interior Ferrous Metal:
 - a. Semigloss Acrylic-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Interior ferrous-metal primer.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
- 9. Interior Zinc-Coated Metal (except Raceways):
 - a. Semigloss Acrylic-Enamel Finish: One finish coat(s) over a primer.
 - 1) Primer: Interior zinc-coated metal primer.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
- C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION**3.1 APPLICATION**

- A. Raceways and Duct Banks More Than 600 V Concealed within Buildings: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways and Metal-Clad Cables More Than 600 V: Identify with "DANGER-HIGH VOLTAGE" in black letters at least 2 inches (50 mm) high, with self-adhesive vinyl labels. Repeat legend at 10-foot (3-m) maximum intervals.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A: Identify with orange self-adhesive vinyl label.
- D. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands.
1. Fire Alarm System: Red.
 2. Fire-Suppression Supervisory and Control System: Red and yellow.
 3. Combined Fire Alarm and Security System: Red and blue.
 4. Security System: Blue and yellow.
 5. Mechanical and Electrical Supervisory System: Green and blue.
 6. Telecommunication System: Green and yellow.
 7. Control Wiring: Green and red.
- E. Power-Circuit Conductor Identification: For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
- F. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.
- G. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source and circuit number.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
- I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Limit use of underground-line warning tape to direct-buried cables.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
 2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
- K. Instruction Signs:
1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Adhesive film label with clear protective overlay. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 2. Equipment to Be Labeled:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Contactors.
 - c. Master clock and program equipment.
 - d. Monitoring and control equipment.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.
- F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded conductors.
 - 1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - 4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.
- J. Painted Identification: Prepare surface and apply paint according to Division 09 painting Sections.

END OF SECTION 260553

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

**SECTION 262816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Bolted-pressure contact switches.
 - 4. High-pressure, butt-type contact switches.
 - 5. Molded-case circuit breakers.
 - 6. Molded-case switches.
 - 7. Enclosures.

1.3 DEFINITIONS

- A. GD: General duty.
- B. GFCI: Ground-fault circuit interrupter.
- C. HD: Heavy duty.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current rating.
 - 4. UL listing for series rating of installed devices.
 - 5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Manufacturer Seismic Qualification Certification: Submit certification that enclosed switches and circuit breakers, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems" Include the following:
 - 1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Qualification Data: For testing agency.
- E. Field quality-control test reports including the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- F. Manufacturer's field service report.
- G. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 - 2. Time-current curves, including selectable ranges for each type of circuit breaker.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Ambient Temperature: Not less than **minus 22 deg F** (**minus 30 deg C**) and not exceeding **104 deg F** (**40 deg C**).
 - 2. Altitude: Not exceeding **6600 feet** (**2010 m**).

1.7 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Spares: For the following:
 - a. Potential Transformer Fuses: 4
 - b. Control-Power Fuses: 6
 - c. Fuses and Fusible Devices for Fused Circuit Breakers: 2
 - d. Fuses for Fusible Switches: 4
 - e. Fuses for Fused Power Circuit Devices: 4
 - 2. Spare Indicating Lights: Six (6) of each type installed.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES**A. Available Manufacturers:**

1. General Electric Co.; Electrical Distribution & Control Division.
2. Siemens Energy & Automation, Inc.
3. Square D/Group Schneider.

B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type GD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.**C. Nonfusible Switch, 600 A and Smaller: NEMA KS 1, Type GD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.****D. Accessories:**

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.
3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.3 FUSED POWER CIRCUIT DEVICES**A. Bolted-Pressure Contact Switch: UL 977; operating mechanism shall use a rotary-mechanical-bolting action to produce and maintain high-clamping pressure on the switch blade after it engages the stationary contacts.****1. Available Manufacturers:**

- a. Boltswitch, Inc.
- b. Pringle Electrical Mfg. Co.
- c. Siemens Energy & Automation, Inc.
- d. Square D/Group Schneider.

B. High-Pressure, Butt-Type Contact Switch: UL 977; operating mechanism shall use butt-type contacts and a spring-charged mechanism to produce and maintain high-contact pressure when switch is closed.**1. Available Manufacturers:**

- a. General Electric Co.; Electrical Distribution & Control Division.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2. Main Contact Interrupting Capability: Twelve times the switch current rating, minimum.
3. Operating Mechanism: Manual handle operation to close switch stores energy in mechanism for closing and opening.
 - a. Electrical Trip: Operation of lever or push-button trip switch, or trip signal from ground-fault relay or remote-control device, causes switch to open.
 - b. Mechanical Trip: Operation of mechanical lever or push button or another device causes switch to open.
4. Auxiliary Switches: Factory installed, SPDT, with leads connected to terminal block, and including one set more than quantity required for functional performance indicated.
5. Service-Rated Switches: Labeled for use as service equipment.
6. Ground-Fault Relay: Comply with UL 1053. Self-powered type with mechanical ground-fault indicator, test function, tripping relay with internal memory, and three-phase current transformer/sensor.
 - a. Configuration: Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground fault indicator.
 - b. Internal Memory: Integrates the cumulative value of intermittent arcing ground-fault currents and uses the effect to initiate tripping.
 - c. No-Trip Relay Test: Operation of "no-trip" test control permits ground-fault simulation test without tripping switch.
 - d. Test Control: Simulates ground fault to test relay and switch (or relay only if "no-trip" mode is selected).
7. Open-Fuse Trip Device: Arranged to trip switch open if a phase fuse opens.

2.4 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES**A. Manufacturers:**

1. General Electric Co.; Electrical Distribution & Control Division.
2. Moeller Electric Corporation.
3. Siemens Energy & Automation, Inc.
4. Square D/Group Schneider.

B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip-Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
 5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
 6. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.
- C. Molded-Case Circuit-Breaker Features and Accessories:
1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
 3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
 4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 5. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring and Control."
 6. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 7. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
 8. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 9. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 10. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
- D. Molded-Case Switches: Molded-case circuit breaker with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- E. Molded-Case Switch Accessories:
1. Lugs: Mechanical style suitable for number, size, trip ratings, and material of conductors.
 2. Application Listing: Type HACR for heating, air-conditioning, and refrigerating equipment.
 3. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage. Provide "dummy" trip unit where required for proper operation.
 4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay. Provide "dummy" trip unit where required for proper operation.
 5. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 6. Key Interlock Kit: Externally mounted to prohibit operation; key shall be removable only when switch is in off position.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

2.5 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 - 1. Outdoor Locations: NEMA 250, Type 3R.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONCRETE BASES

- A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.
- B. Concrete base is specified in Division 26 Section "Hangers and Supports for Electrical Systems," and concrete materials and installation requirements are specified in Division 03.

3.3 INSTALLATION

- A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.
- B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.
- C. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.4 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems."
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 26 Section "Identification for Electrical Systems."

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Prepare for acceptance testing as follows:
 - 1. Inspect mechanical and electrical connections.
 - 2. Verify switch and relay type and labeling verification.
 - 3. Verify rating of installed fuses.
 - 4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.
- C. Tests and inspections and prepare test reports.
- D. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
- E. Perform the following field tests and inspections and prepare test reports:
 - 1. Test mounting and anchorage devices according to requirements in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
 - 2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 4. Infrared Scanning:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Open or remove doors or panels so connections are accessible to portable scanner.
 - b. Follow-Up Infrared Scanning: Perform an additional follow-up infrared scan of each unit 11 months after date of Substantial Completion.
 - c. Instruments, Equipment and Reports:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 2) Prepare a certified report that identifies enclosed switches and circuit breakers included and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

SANITARY SEWER PUMP STATION A-12 REHABILITATION

PROJECT 11880

3.7 CLEANING

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.
- B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

APPENDIX 1



Environmental Protection and Growth Management Department

Environmental Licensing and Building Permitting Division

1 North University Drive, Suite 201-A • Plantation, Florida 33324 • 954-519-1483 • FAX 954-519-1412

**LICENSE FOR INSTALLATION OF WASTEWATER
COLLECTION/TRANSMISSION SYSTEM****APPLICANT:**

City of Fort Lauderdale
Attention: Stan Edwards, P.E., Project Engineer
100 N Andrews Ave
Fort Lauderdale, FL 33301

BC-DER LICENSE NO.: WW-61974**EXPIRATION DATE:** 04/16/2020**DEP ID NO.:** GTL #054569-569**SEC-TWP-RNG:** 16-50-42**PROJECT:** City of Fort Lauderdale Lift Station A-12
Rehabilitation

This license is issued under the provisions of Chapter 27 of the Broward County Code of ordinances. The above named-applicant, hereinafter called licensee, is hereby authorized to perform the work shown on the approved drawing(s), plans, documents, and specifications submitted by applicant and made a part hereof and described specifically below. If no objection to this license is received within 14 days you will be deemed to have accepted it and all the attached terms and conditions.

Your notification of Intent to Use General Permit for construction of the referenced wastewater collection system has been evaluated. This project complies with the Department of Environment Protection General Permit conditions of the Florida Administrative Code rule chapters 62-4, Part II., or for Individual Permit, under FS 403.87 and FAC 62-4, 62-600 and 62-604.

FORCE MAIN: 38 LF of 12" DIP**LIFT STATION:** One Triplex: 1,312 GPM @ 90' TDH (Per Individual Pump)**SUBJECT TO SPECIFIC CONDITIONS # 1 through # 7.**

In accordance with: Plans, Sheets C-1 thru C-15 of 15, E-1 thru E-13 of 13, and M-1 thru M-3 of 3 (Received 06/18/2014 and Revised 04/06/2015). None Attached. City of Fort Lauderdale. Project #: 11880.

Located at: 900 AVOCADO ISLE, Fort Lauderdale 33315

Serving: Rehab of Pump Station A-12 with Existing Wet Well/Dry Well Configuration.


Issued this 17th day of April, 2015.

Environmental Protection and Growth Management Dept.

Prepared by Yvel Rocher, P.E.

cc: FDEP/WPB

Thuy Turner, AICP/DMD Front Desk
Hardeep Anand, Public Works Director, City of Fort
Lauderdale GT Lohmeyer WWTP



Garth Hinckle, Jr, P.E., Supervisor
Domestic Wastewater Program

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and enforceable by the EPD pursuant to Chapter 27 of the Broward County Code of Ordinances. The EPD will review this license periodically and may revoke the license, initiate administrative and/or judicial action for any violation of the conditions by the licensee, its agents, employees, servants or representatives.
2. This license is valid only for the specific uses set forth in the license application and any deviation from the approved uses may constitute grounds for revocation and enforcement action by the EPD.
3. In the event the Licensee is temporarily unable to comply with any of the conditions of the license, the licensee shall notify the Broward County Environmental Protection Department within 8 hours. Within 3 working days of the event, the licensee shall submit a written report to the Broward County Environmental Protection Department that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention toward repair, replacement, and reconstruction of destroyed facilities, and a schedule of events leading toward operation within the license condition.
4. The issuance of this license does not convey any vested rights or exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, or any violations of federal, state or local laws or regulations.
5. This license must be available for inspection on Licensee's premises during the entire life of the license.
6. By accepting this license, the Licensee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, that are submitted to the EPD, may be used by the EPD as evidence in any enforcement proceeding arising under Chapter 27 of the Broward County Code of Ordinances, except where such use is prohibited by Section 403.111, Florida Statutes.
7. This Licensee agrees to comply with Chapter 27, Broward County Code of Ordinances, as amended.
8. Any new owner of a licensed facility shall apply by letter for a transfer of license within thirty (30) days after sale or legal transfer. The transferor shall remain liable for performance in accordance with the license until the transferee applies for, and is granted a transfer of license. The Transferee shall also be liable for performance in accordance with the license.
9. The licensee, by acceptance of this license, specifically agrees to allow access to the licensed source at reasonable times by EPD personnel for the purposes of inspection and testing to determine compliance with this license and Chapter 27 of the Broward County Code of Ordinances.
10. This license does not constitute a waiver or approval of any other license that may be required for other aspects of the total project.
11. If the Licensee wishes to renew the license or extend its terms, he shall make application 60 days prior to its expiration. Expired licenses are not renewable.
12. In addition to the general conditions set forth above, each license issued by the EPD shall contain specific conditions determined by site conditions and requirements pursuant to the regulations as determined by the Broward County Environmental Protection Department. Licensee agrees that specific conditions are enforceable by the EPD for any violation thereof.

SPECIFIC CONDITIONS:

1. This license is valid for construction of the sewage collection/transmission system only. All connections to the system must be approved by the Broward Environmental Protection Department prior to the issuance of a building permit.
2. Any deviation from approved plans or specifications affecting capacity, flow or operation of units shall be submitted to and approved by the Broward County Environmental Protection Department before such changes are made.
3. The applicant shall be responsible for supplying as-built drawing to the Broward County Environmental Protection Department on completion of the project. Such drawing will be signed and sealed by an engineer registered in the state of Florida and shall be based on accurate records maintained by the engineer or by a land surveyor currently registered in the state of Florida. Such drawing will indicate locations and elevations of all pipe line, manholes, pump stations and appurtenance installed under this project. No connections to the system Will Be Approved until the above Described As-built Drawings Have Been Delivered to and Approved by the Broward County Environmental Protection Department.

APPLICANT:
City of Fort Lauderdale
Attention: Stan Edwards, P.E., Project Engineer
100 N Andrews Ave
Fort Lauderdale, FL 33301

BC-DER LICENSE NO.: WW-61974
EXPIRATION DATE: 04/16/2020
DEP ID NO.: GTL #054569-569
SEC-TWP-RNG: 16-50-42
PROJECT: City of Fort Lauderdale Lift Station A-12
Rehabilitation

SPECIFIC CONDITIONS (Continued From Page 2)

4. (Lift Stations) One (1) complete set of the operation & maintenance manual must be submitted along with the required "As-built" record drawings. The minimum manual should be bound in a 3/4-inch, 3 ring binder. Sections of the manual should include: (1) service agreements; (2) pump station specifications and start up report; (3) pump station operation and maintenance plan; (4) monthly reports - inserted monthly; (5) general correspondence and service records - insert as received; and other sections as deemed necessary. The Engineer must distribute the operation & maintenance manuals as prescribed on the DEP Form 62-604.300(3)(b), Part III (1) and (2) under his seal and signature.
5. (Publicly Maintained Lift Station) Signage is required in a conspicuous location at the lift station. It shall indicate the lift station name and an emergency contact phone number(s).
6. NOTE: Future enforcement of violations may be minimized by recording all proper maintenance procedures.
7. An email containing a PDF attachment or a CD file of the As-built Site Plan which clearly displays the contents of the project as well as its service boundaries shall be submitted to ELBPD at the time of certification. At least one of the nearest street intersections must be also labeled on the exhibit for ease of geographical reference.



Florida Department of Environmental Protection

Rick Scott
Governor

Southeast District Office
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Herschel T. Vinyard Jr
Secretary

CERTIFIED MAIL

In the Matter of an
Application for Permit by:

City of Fort Lauderdale
Attention: Stan Edwards, P.E., Project
Engineer
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER: GTL #054569-569
ELBP LICENSE: WW-61974
ISSUANCE DATE: 04/17/2015
EXPIRATION DATE: 04/16/2020
COUNTY: BROWARD
PROJECT: City of Fort Lauderdale Lift
Station A-12 Rehabilitation
CONNECTED TO: G T L

NOTICE OF PERMIT ISSUANCE

Enclosed is Permit No. GTL #054569-569 to construct a domestic wastewater collection/transmission system, issued pursuant to 403.087(1), Florida Statutes.

The Department's proposed agency action shall become final unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, Florida Statutes, within fourteen days of receipt of notice. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Petitions by the applicant or any of the persons listed below must be filed within fourteen days of receipt of this written notice. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), Florida Statutes, must be filed within fourteen days of publication of the notice or within fourteen days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within fourteen days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within fourteen days of receipt of notice shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, Florida Statutes. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

- (a) The name, address, and telephone number of each petitioner; the name, address, and telephone number of the petitioner's representative, if any; the Department permit identification number and the county in which the subject matter or activity is located;
- (b) A statement of how and when each petitioner received notice of the Department action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department action;

PERMITEE: City of Fort Lauderdale

PERMIT NUMBER: GTL #054569-569

- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
- (f) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation under Section 120.573, Florida Statutes, is not available for this proceeding.

This permit action is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this permit will not be effective until further order of the Department.


Any party to the permit has the right to seek judicial review of the permit action under Section 120.68, Florida Statutes, by the filing of a notice of appeal under Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when this permit action is filed with the clerk of the Department.

Executed in Plantation, Florida

BROWARD COUNTY

Environmental Protection and Growth Management Department
as delegated agent for:

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

FOR  4/13/15
Leonard Vialpando, PE, Director Date
Environmental Licensing and Building Permitting Division

PERMITEE: City of Fort Lauderdale


PERMIT NUMBER: GTL #054569-569

FILING AND ACKNOWLEDGMENT

FILED, on this date, under Section 120.52, Florida Statutes, with the designated deputy clerk, receipt of which is hereby acknowledged.



Yvel Rocher



Date

CERTIFICATE OF SERVICE

The undersigned hereby certifies that this NOTICE OF PERMIT ISSUANCE and all copies were mailed before the close of business on/or before the date noted below to the listed persons.



Yvel Rocher



Date

Certified copies furnished to: City of Fort Lauderdale

Copies furnished by U.S. mail to: FDEP/WPB
Thuy Turner, AICP/DMD Front Desk
Hardeep Anand, Public Works Director, City of Fort Lauderdale GT Lohmeyer
WWTP



Florida Department of Environmental Protection

Southeast District Office
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Rick Scott
Governor

Herschel T. Vinyard Jr.
Secretary

State of Florida

Domestic Wastewater Collection/Transmission Individual Permit

PERMITTEE:

City of Fort Lauderdale
Attention: Stan Edwards, P.E., Project Engineer
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:

GTL #054569-569

ELBP LICENSE:

WW-61974

ISSUANCE DATE:

04/17/2015

EXPIRATION DATE:

04/16/2020

COUNTY:

BROWARD

PROJECT:

City of Fort Lauderdale Lift
Station A-12 Rehabilitation

CONNECTED TO:

G T L

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-4 and 62-604, Florida Administrative Code (F.A.C.). The Broward County Environmental Protection & Growth Management Department (EPGMD) issues this permit as a delegated local program of the Florida Department of Environmental Protection (Department).

The above named permittee is hereby authorized to construct the facilities shown on the application and other documents on file with the Department and/or EPGMD and made a part hereof and specifically described as follows:

DESCRIPTION OF PROJECT: FORCE MAIN:

38 LF of 12" DIP

LIFT STATION:

One Triplex: 1,312 GPM @ 90' TDH (Per Individual Pump)

TO SERVE:

Rehab of Pump Station A-12 with Existing Wet Well/Dry Well Configuration.

LOCATION OF PROJECT:

900 AVOCADO ISLE, Fort Lauderdale 33315

IN ACCORDANCE WITH:

The limitations, requirements and other conditions set forth in this permit.

ELBP License No. WW-61974 has also been issued for this project.

PERMITTEE:

City of Fort Lauderdale
Attention: Stan Edwards, P.E., Project Engineer
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER: GTL #054569-569
ELBP LICENSE: WW-61974
ISSUANCE DATE: 04/17/2015
EXPIRATION DATE: 04/16/2020
COUNTY: BROWARD
PROJECT: City of Fort Lauderdale Lift
Station A-12 Rehabilitation
CONNECTED TO: G T L

PERMIT CONDITIONS:

1. This permit is subject to the general conditions of Rule 62-4.160, F.A.C., as applicable. This rule is available at the Department's Internet site at: <http://www.dep.state.fl.us/water/wastewater/rules.htm#domestic> [62-4.160, 05/01/2003]
2. Upon completion of construction of the collection/transmission system project, and before placing the facilities into operation for any purpose other than testing for leaks or testing equipment operation, the permittee shall submit to the EPGMD Form 65-604.300(8)(b), Request for Approval to Place a Domestic Wastewater Collection/Transmission System into Operation. This form is available at the Department's Internet site at: <http://www.dep.state.fl.us/water/wastewater/forms.htm> [62-604.700(2), 11/06/2003]
3. The new or modified collection/transmission facilities shall not be placed into service until the EPGMD clears the project for use. [62.604.700(3), 11/06/2003]
4. Permit revisions shall only be made in accordance with Rule 62-4.050(4)(s), F.A.C. Request for revisions shall be made to the EPGMD in writing and shall include the appropriate fee. Revisions not covered under Rule 62-4.050(4)(s), F.A.C., shall require a new permit. [62-604.600(8), 11/06/2003]
5. Abnormal events shall be reported to the Department's West Palm Beach District Office in accordance with Rule 62-604.550, F.A.C. For unauthorized spills of wastewater in excess of 1000 gallons per incident, or where information indicates that public health or the environment may be endangered, oral reports shall be provided to the STATE WATCH OFFICE TOLL FREE NUMBER (800) 320-0519 as soon as practical, but no later than 24 hours from the time the permittee or other designee becomes aware of the circumstances. Unauthorized releases or spills less than 1000 gallons per incident are to be reported orally to the Department's West Palm Beach District Office within 24 hours from the time the permittee, or other designee becomes aware of the circumstances. [62-604.550, 11/06/2003]

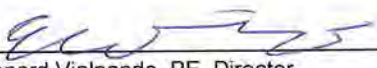
PERMITTEE:

City of Fort Lauderdale
Attention: Stan Edwards, P.E., Project Engineer
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER: GTL #054569-569
ELBP LICENSE: WW-61974
ISSUANCE DATE: 04/17/2015
EXPIRATION DATE: 04/16/2020
COUNTY: BROWARD
PROJECT: City of Fort Lauderdale Lift
Station A-12 Rehabilitation
CONNECTED TO: G T L

Executed in Plantation, Florida

BROWARD COUNTY
Environmental Protection and
Growth Management Department

For 
Leonard Vialpando, PE, Director
Environmental Licensing and
Building Permitting Division

As delegated agent for:
State of Florida,
Department of Environmental Protection

DATE: 4/17/15

APPENDIX 2



**ASBESTOS & LEAD CONTAINING PAINT
SURVEY REPORT
SGF PROJECT #F-3844-15**

**CITY OF FORT LAUDERDALE
PUMP STATION A-12
900 AVOCADO ISLE
FORT LAUDERDALE, FLORIDA
COFL PROJECT #11880**

**ASBESTOS & LEAD CONTAINING PAINT
SURVEY REPORT
SGF PROJECT #F-3844-15**

**CITY OF FORT LAUDERDALE
PUMP STATION A-12
900 AVOCADO ISLE
FORT LAUDERDALE, FLORIDA
COFL PROJECT #11880**

PREPARED FOR

Ms. Maria Paituvi, P.E.
ESciences Incorporated
224 S.E. 9th Street
Fort Lauderdale, FL 33316

PREPARED BY

SGF Environmental Consultants, Inc.
10239 West Sample Road
Coral Springs, Florida 33065
(954) 344-6106
FAX (954) 753-2371
e-mail: mfell@sgfenvironmental.com

July 24, 2015

TABLE OF CONTENTS

	Page Number
SCOPE OF WORK	1
BACKGROUND	2
Structure Information	2
ASBESTOS SURVEY	3
Methodology	3
Results	4
Discussion	4
Recommendations	5
LEAD CONTAINING PAINT SURVEY	6
Methodology	6
Results	7
Discussion	7
Recommendations	8
LIMITATIONS	8
TABLES	
Table I – PLM Sample Results	
APPENDICES	
APPENDIX A – PLM Laboratory Reports & Chain of Custody Documentation	
APPENDIX B – Lead Containing Paint Survey Report	
TERMS AND CONDITIONS	



ESciences Incorporated
224 S.E. 9th Street
Fort Lauderdale, FL 33316

July 24, 2015

Attn: Ms. Maria Paituvi, P.E.
Senior Engineer

Subject: Asbestos & Lead Containing Paint Survey Report (#F-3844-15)
City of Fort Lauderdale Pump Station A-12
900 Avocado Isle
Fort Lauderdale, FL

Dear Ms. Paituvi:

Subsequent to your requisition of April 1, 2015, and receipt of authorization to proceed on June 22, 2015, SGF Environmental Consultants, Inc. (SGF), conducted environmental services at and for the above referenced facility, located in Fort Lauderdale, Florida, on July 1, 2015.

SCOPE OF WORK

The scope of work included: (1) performance of an asbestos inspection of the accessible portions of the referenced structure, performed under the direction of a Florida licensed asbestos consultant; (2) collection of representative bulk samples of suspect asbestos-containing building materials throughout the applicable and accessible areas; (3) transport of samples to the laboratory for asbestos analysis using polarized light microscopy methodology (PLM) methodology; (4) performance of a lead containing paint survey of the accessible portions of the referenced structure, performed by an individual certified by EPA to conduct lead-based paint activities; (5) collection of representative paint chip samples of suspect lead-containing painted surfaces throughout the applicable and accessible areas; and (6) transport of samples to the laboratory for lead analysis using EPA Method SW 846 7000B. This study is subject to the limitations stated in the *Limitations* section and to the attached *Terms and Conditions*.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

BACKGROUND

Based on information provided by the City of Fort Lauderdale, Pump Station A-12 is located underground at 900 Avocado Isle. The room is accessible via a fixed ladder through a $5.2\pm$ foot wide entry port that is $3.5\pm$ feet in height. This station is scheduled for rehabilitation. Renovations are reported to include removal of piping, pumps, valves, and electrical equipment, sandblasting/pressure washing of interior walls followed by installation of new equipment.



Structure Information

Pump station A-12 is a two-level poured concrete structure constructed *circa* the 1960's. Each level is $260\pm$ square feet. Ceiling height is $7\pm$ feet at the first level and $8.5\pm$ feet at the basement level. Piping is of cast iron construction. No thermal system insulation (TSI), spray-on insulation or fireproofing, adhesives, or ceiling, wall (except for plaster on some walls) and flooring finishes were noted.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

ASBESTOS SURVEY

Methodology

Sampling Methodology. In each applicable area, the survey personnel conducted both a visual and tactile inspection of the observed suspect materials. Prior to sample collection, the designated area to be sampled was wetted with an amended water solution to minimize the potential release of fibers. A knife, or appropriate sampling tool was used to penetrate all layers of the material and to remove a small portion of the suspect material.

The sampling tool was cleaned after the collection of each bulk sample. The sampled material was placed into a labeled plastic sample bag and sealed. Specific data pertaining to the sample material's physical condition, friability, accessibility, and other applicable data was noted at each sample location.

Thirteen (13) bulk samples of building materials were collected from the structure, and analyzed by the laboratory for asbestos content using polarized light microscopy (PLM) methodology. The collected samples remained in the custody of SGF until they were submitted via Federal Express with chain-of-custody documentation to Environmental Hazards Services, Inc. (EHS), in Richmond, Virginia on July 8, 2015. Laboratory submittal and receipt dates are provided on the corresponding chain-of-custody documentation.

Analytical Methodology. The laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to perform bulk sample analysis (certificate number 101882-00). Bulk sample analysis for the presence of asbestos was performed in accordance with the Environmental Protection Agency's recommended test method; Interim Method 600/M4-82-020, "The Determination of Asbestos Bulk Samples" using Polarized Light Microscopy (PLM) with dispersion staining. Percentages of asbestos are estimated by visual volumetric means. False negative results may occur when the samples contain asbestos fibers too small to be resolved by the PLM analytical method. The limit of asbestos detection by PLM is approximately one percent (1%) by area.

Inaccessible Areas/Materials Not Sampled. For sampling purposes, the inaccessible/not sampled areas included: (1) fixtures; (2) equipment that would require dismantling; (3) areas exterior to or below the structure; (4) between walls where insulation or insulation on pipe work may exist (where applicable); and (5) piping and/or pipe chases that may extend outside the structure.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

In the event that suspect asbestos containing materials (ACM) is encountered in inaccessible areas during renovation or demolition activities, this material(s) should be sampled and analyzed prior to removal to confirm asbestos content prior to any disturbance to the material. According to applicable federal and state regulations, suspect materials not previously analyzed, must be sampled and analyzed to determine asbestos content prior to any renovation or demolition activity, or they may be presumed asbestos containing materials (PACM).

Results

No asbestos was detected in the analyzed samples. The United States Environmental Protection Agency (US EPA) has defined ACM as those materials that contain greater than one percent (1%) asbestos. PLM analytical results are outlined in Table I. Bulk sample laboratory reports and chain-of-custody documentation are provided in *Appendix A*.

Discussion

A Notice of Demolition or Asbestos Renovation (Notification) must be provided to the Florida Department of Environmental Protection (FDEP) and/or the Broward County Pollution Prevention, Remediation and Air Quality Division (PPRAQD) at least ten (10) business days prior to the start of the following type projects:

1. All demolition projects whether asbestos is present or not;
2. All ACM renovation projects that include asbestos RACM at or above the legal thresholds (160 square feet or 260 linear feet).

Additional notification and compliance information can be obtained through the links listed below.

1. Florida Department of Environmental Protection Division of Air Resource Management- Notice of Demolition or Asbestos Renovation

<http://www.dep.state.fl.us/air/rules/forms/asbestos.htm>

2. PPRAQD Compliance Program – Asbestos Regulations

<http://www.broward.org/PollutionPrevention/AirQuality/AsbestosCompliance/Pages/AsbestosRegulations.aspx>

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

Recommendations

SGF recommends the following:

1. That federal, state and local regulations regarding notification and asbestos removal requirements be reviewed for compliance prior to renovation/demolition activities;
2. In the event that suspect ACM is encountered in inaccessible/not sampled areas during renovation or demolition activities, these materials should be sampled and analyzed prior to removal to confirm asbestos content prior to any disturbance to the material, or they can be considered PACM.*

*Pursuant to EPA 40 CFR Part 61, Subpart M National Emission Standards for Asbestos (NESHAP), "regulated asbestos-containing material" (RACM) must be removed from a facility being demolished or renovated before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access to the material for subsequent removal. Removal is to be conducted by a Florida licensed asbestos abatement contractor with prior notification to the appropriate state and local agencies.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

LEAD CONTAINING PAINT SURVEY

The lead containing paint survey was conducted on July 1, 2015, by GLE Associates, Inc. (GLE) to provide information needed to comply with 29 CFR Part 1926 “Lead Exposure in Construction; Interim Final Rule” for future demolition and/or renovation activities. The Scope of the “Lead Exposure in Construction; Interim Final Rule” “applies to all occupational exposure to lead in all construction work in which lead, in any amount, is present in an occupationally related context.”

The Occupational Safety and Health Administration (OSHA) has developed task-related triggers that require the implementation of the provisions required in 29 CFR Part 1926 due to the lack of a firm correlation between lead levels in paint and airborne lead levels during construction activities. Demolition and/or renovation activities involve tasks covered under this standard. At this time, there are no specific notification requirements associated with lead paint for this type of facility.

Methodology

Sampling Methodology. The survey was performed by observing and testing accessible painted component surfaces of the building. After the overall visual survey was completed, an inventory of painted surfaces was developed. The surveyor then subdivided the areas into homogeneous areas of apparent similar paint history. For this project, a total of six (6) samples of suspect lead containing paint were collected from the facility including: (1) the exterior concrete (white); (2) interior pipes (green, black and gray); (3) interior pump (gray); and (4) interior valve (blue). Interior walls were unpainted.

Analytical Methodology. The samples were submitted to Environmental Hazards Services, LLC, an accredited laboratory recognized under EPA’s National Lead Laboratory Accreditation Program (NLLAP). The samples were analyzed using EPA Method SW 846 7000B and the results are reported in percentage of lead by weight of the paint sample (% Wt).

Inaccessible Areas/Materials Not Sampled. Due to the inaccessibility of some building elements, *e.g.*, painted surfaces on the sub-grade exterior of the pump station, etc., it is conceivable that all potential lead-containing paint within the extent of this survey may not have been located and identified.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

Results

The results of the observations and laboratory analysis indicate that five (5) of the six (6) painted surfaces tested contain a concentration (% by weight) of lead within the paint greater than the laboratory's detection limit, *i.e.*, the white exterior concrete paint; green, black and grey interior pipe paint; and gray interior pump paint.

Discussion

Under the present OSHA lead construction standard, any identified lead-containing paint affected by construction activities falls under the requirements of 29 CFR 1926, there are no quantity threshold exemptions. There are no current government guidelines defining a lead paint concentration that creates a hazardous atmosphere when disturbed. Based on current OSHA guidelines, there are two options for proper handling of lead painted materials that will be disturbed during renovation/demolition activities, *i.e.*: (1) abatement of the materials prior to performance of the work; or (2) conductance of a negative exposure assessment (NEA).

Abatement Option. Although there is no state or federal requirement for removal of lead containing paint prior to renovation/demolition, abatement by a trained professional prior to renovation/demolition would eliminate the need for an NEA by the demolition contractor. The removal of the materials by a trained professional prior to renovation/demolition at select locations where abrasive blasting, welding, cutting and/or torch burning are planned is recommended.

NEA Option. If abatement is not performed, the employer must implement OSHA prescribed protective measures until they can demonstrate that employee exposure is not in excess of the action level. For those employees who will be disturbing lead-containing paint, their employer must conduct an NEA by monitoring employee exposure to determine if any employee is exposed to lead at or above 30 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) (8-hour Time Weighted Average (TWA)). For all identified lead painted materials where manual demolition (*e.g.*, drywall) manual scraping, manual sanding and heat gun applications are planned: provide workers with interim protection as outlined in the OSHA Lead Construction Standard until the employee exposure monitoring indicate that that all tasks being performed are not exposing employees above the Permissible Exposure Limit (PEL).

The interim employee protection measures include but are not limited to the following: appropriate respiratory protection; appropriate personal protective clothing and equipment; change areas; hand washing facilities; biological monitoring; and training.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

In accordance with the EPA, all waste generated during lead paint removal and subsequent manual demolition and/or renovation activities must be collected, containerized, sampled and characterized by Toxicity Characteristic Leaching Procedure (TCLP) testing for lead for waste disposal purposes.

The Lead Containing Paint Survey Report prepared by GLE is provided in *Appendix B*. Estimated quantities for the lead containing paint are provided in Table 2.2-1 - *Appendix B*.

Recommendations

In the event that painted surfaces not identified in this report are encountered in inaccessible areas during renovation or demolition activities, SGF recommends that this material(s) should be sampled and analyzed prior to removal to confirm lead content prior to any disturbance to the material.

LIMITATIONS

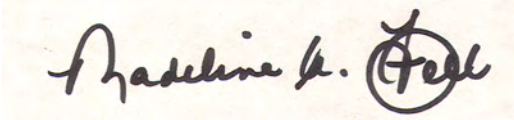
Inaccessible/not sampled areas are outlined in the text of this report. Materials encountered during renovation activities not noted in this report, should not be disturbed until they have been sampled and identified as non-asbestos materials/non-lead containing paint through laboratory analysis. In addition, this report is limited to the performance of an asbestos and lead containing paint survey. Review of OSHA requirements that may be related to work practices in confined spaces is outside the scope of this project.

The conclusions embodied in this report are based upon the information available to SGF at the time of this submittal. SGF therefore reserves the right to amend its recommendations and opinions, if information obtained at a later date so requires. In addition, the Client recognizes that the Company's services are solely for the benefit of the Client and addressee, and that any person or party designated by Client to receive information regarding work for Client may not do so without the express written permission of SGF and shall be subject to the attached SGF *Terms and Conditions*.

ESciences Incorporated
City of Fort Lauderdale Pump Station A-12
SGF Project #F-3844-15
July 24, 2015

We have enjoyed working with you on this project. If you have any questions or comments, please do not hesitate to contact the undersigned at (954) 344-6106 or at mfell@sgfenvironmental.com.

Respectfully submitted,
SGF Environmental Consultants, Inc.

A handwritten signature in dark ink on a light-colored rectangular background. The signature reads "Madeline A. Fell" in a cursive script. The "Fell" part is circled.

Madeline A. Fell, P.G., L.A.C.
President
(7/24/2015)

Asbestos Consultants Lic. #AX0000030
Business License #ZA0000177

TABLE I
PLM Sample Results



**TABLE I
PLM SAMPLE RESULTS**

Sample No.	Lab No.	Sample Description	Sample Location	Results
<i>City of Fort Lauderdale – Pump Station A-12 Sample Prefix 15-07-01341</i>				
1	1341-001	concrete (lt. gray/dk. gray)	Exterior Access Point (surface – east center side)	NAD
2	1341-002	concrete (lt. gray/dk. gray)	Exterior Access Point (surface – west center side)	NAD
3	1341-003	gasket material (black)	Generator Hookup Access	NAD
4	1341-004	plaster (lt. gray/dk. gray)	Upper Level (over concrete – south side)	NAD
5	1341-005	plaster (lt. gray/dk. gray)	Upper Level (over concrete – east side)	NAD
6	1341-006	plaster (tan/lt. gray/dk. gray)	Lower Level (over concrete – south side)	NAD
7	1341-007	concrete (tan/lt. gray/dk. gray)	Upper Level (floor – west side)	NAD
8	1341-008	concrete (tan/lt. gray/dk. gray)	Upper Level (floor – east side)	NAD

TABLE I
PLM SAMPLE RESULTS

Sample No.	Lab No.	Sample Description	Sample Location	Results
9	1341-009	concrete (tan/lt. gray/dk. gray)	Lower Level (equipment support pad)	NAD
10	1341-010	gasket material (green/black)	Upper Level (discharge pump piping – lower gasket)	NAD
11	1341-011	gasket material (green/black)	Upper Level (discharge pump piping - upper gasket)	NAD
12	1341-012	gasket material (green/black)	Lower Level (discharge pump piping)	NAD
13	1341-013	concrete (lt. gray/dk. gray)	Upper Level (wall – south center area)	NAD

PLM – Polarized Light Microscopy
NAD – No Asbestos Detected

APPENDICES

APPENDIX A

PLM Laboratory Reports
&
Chain of Custody Documentation



Environmental Hazards Services, L.L.C.

7469 Whitepine Rd

Richmond, VA 23237

Telephone: 800.347.4010

Asbestos Bulk Analysis Report

Report Number: 15-07-01341

Client: SGF Environ. Consultants
10239 West Sample Road
Coral Springs, FL 33065

Received Date: 07/10/2015

Analyzed Date: 07/14/2015

Reported Date: 07/15/2015

Project/Test Address: F-3844-15; COFL Pump Station A-12; 900 Avocado Isle; Fort
Lauderdale, FL

Client Number:
10-3069

Fax Number:
954-753-2371

Laboratory Results

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
15-07-01341-001	A-12-1		Gray/White Hard Cementitious; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-002	A-12-2		Gray/White Hard Cementitious; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-003	A-12-3		Black Rubbery; Homogeneous	NAD	100% Non-Fibrous
15-07-01341-004	A-12-4		Gray Cementitious; White Hard Paint-Like; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-005	A-12-5		Gray Cementitious; White Hard Paint-Like; Inhomogeneous	NAD	100% Non-Fibrous

Environmental Hazards Services, L.L.C

Client Number: 10-3069

Report Number: 15-07-01341

Project/Test Address: F-3844-15; COFL Pump Station A-12;
900 Avocado Isle; Fort Lauderdale, FL

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
15-07-01341-006	A-12-6		Gray Cementitious; White Hard Paint-Like; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-007	A-12-7		Gray/Beige Hard Cementitious; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-008	A-12-8		Gray/Beige Hard Cementitious; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-009	A-12-9		Gray/Beige Hard Cementitious; Inhomogeneous	NAD	100% Non-Fibrous
15-07-01341-010	A-12-10		Black Rubbery; Green Paint; Inhomogeneous	NAD	4% Synthetic 96% Non-Fibrous
15-07-01341-011	A-12-11		Black Rubbery; Green Paint; Inhomogeneous	NAD	5% Synthetic 95% Non-Fibrous
15-07-01341-012	A-12-12		Black Rubbery; Green Paint; Inhomogeneous	NAD	4% Synthetic 96% Non-Fibrous

Environmental Hazards Services, L.L.C

Client Number: 10-3069

Report Number: 15-07-01341

Project/Test Address: F-3844-15; COFL Pump Station A-12;
900 Avocado Isle; Fort Lauderdale, FL

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
15-07-01341-013	A-12-13		Beige Cementitious; Homogeneous	NAD	100% Non-Fibrous

QC Sample: 79-M22012-1

QC Blank: SRM 1866 Fiberglass

Reporting Limit: 1% Asbestos

Method: EPA Method 600/R-93/116, EPA Method 600/M4-82-020

Analyst: Katherine Charles Harris

Reviewed By Authorized Signatory:

Howard Varner
General Manager

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Each distinct component in an inhomogeneous sample was analyzed separately and reported as a composite. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714 NVLAP #101882-0 VELAP 460172. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection.

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), (for enhanced detection capabilities) for materials regulated by EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

400 Point Count Analysis, where noted, performed per EPA Method 600/R-93/116 with a Reporting Limit of 0.25%.

* All California samples analyzed by Polarized Light Microscopy, EPA Method 600/M4-82-020, Dec. 1982.

LEGEND: NAD = no asbestos detected

13914

SGF ENVIRONMENTAL CONSULTANTS, INC.
10239 West Sample Road Coral Springs, Florida 33065

(954) 344-6106 Fax: (944) 753-2371
E-mail: mfeil@sgfenvironmental.com

MATERIAL SAMPLING DATA SHEET

Project No.: E-3844-15

Survey Date & Time: 7/11/15

Lab ID No.: _____

Project Name: Cof L Pump Station A-12 Surveyor: M. Fell + B. Christiansen Analysis Technique: PLM

Address: 900 Avocado Isle Project Mgr.: M. Fell Turnaround: NORMAL

Fort Lauderdale, FL

Page 1 of 2

SAMPLE NUMBER	DESCRIPTION OF SAMPLED MATERIAL	ON SITE LOCATION OF SAMPLED MATERIAL	COLOR	CONDITION	FRIABLE
1	Concrete	Ext. Access Point	Gray	G	N
2	Concrete	Ext. Access Point	Gray	G	N
3	Gasket Material	Equipment Hookup Access	Pk	G	N
4	Plaster	Upper Level - S side	Gray	G	N
5	Plaster	Upper Level - E side	Gray	G	N
6	Plaster	Lower Level - S side	Gray	G	N
7	Concrete	Floor Upper Level - W side	Gray	G	N
8	Concrete	Floor Upper Level - E side	Gray	G	N
9	Concrete	Equipment Support Pad	Gray	G	N
10	Gasket Material	Pump Piping Lower Gasket	Gray	G	N
RESPONSIBLE PARTY:		TRANSFER NUMBER	TRANSFERRED BY:		ACCEPTED BY:
<u>M. Fell</u>		<u>7/8/15</u>			<u>Thomas</u>
					DATE & TIME
					<u>7/16/15</u>

15-07-01341



Due Date:
07/15/2015
(Wednesday)
AE

YML

(954) 344-6106 Fax: (944) 753-2371
E-mail: mfell@sgfenvironmental.com

1341

Lab ID No.:

Turnaround: Normal

Page 2 of 2

CAM 16-1224
EXHIBIT 4
Page 589 of 663

APPENDIX B

LEAD CONTAINING PAINT SURVEY REPORT

LEAD-CONTAINING PAINT SURVEY REPORT

**Pump Station A-12
900 Avocado Isle
Fort Lauderdale, Florida**

GLE Project No.: 15000-15360

Prepared for:

**SGF Environmental Consultants, Inc.
10239 West Sample Road
Coral Springs, Florida 33065**

July 2015

Prepared by:



**1000 NW 65th Street, Suite 100
Ft. Lauderdale, Florida 33309
754-223-2697 • Fax 754-223-2937**



July 21, 2015

Ms. Madeline Fell
SGF Environmental Consultants, Inc.
10239 West Sample Road
Coral Springs, Florida 33065

**RE: Lead-Containing Paint Survey Report
Pump Station A-12
900 Avocado Isle
Fort Lauderdale, Florida**

Project No.: 15000-15360

Dear Ms. Fell:


GLE Associates, Inc. (GLE) performed a survey to identify lead-containing paint on July 1, 2015, at Pump Station A-12, located in Fort Lauderdale, Florida. The survey was performed by Mr. Brandon Christensen with GLE. This report outlines the sampling and testing procedures, and presents the results along with our conclusions and recommendations.

GLE appreciates the opportunity to work with you on this project. Should you have questions regarding any of the information contained in this report, please do not hesitate to contact our office.

Sincerely,
GLE Associates, Inc.



John C. Simmons
Director of South Florida Operations



Robert B. Greene, PE, PG, CIH, LEED AP
President

JCS/RBG/el

H:\Work\LEAD\15000\15360 SGF LBP- ACM @ 5 Broward County Pump Stations\Reports\A-12\A-12 Lead Survey Report.doc

GLE Associates, Inc.

1000 NW 65th Street, Suite 100 | Ft. Lauderdale, Florida 33309 | 754-223-2697 | Fax: 754-223-2937
Jacksonville | Orlando | Tampa | Miami | Gainesville | Atlanta | Houston | Nashville
Architecture AA 0002369 • Engineer CA 5483 • Asbestos ZA 0000034 • Geology GB 0000297

CAM 16-1224
EXHIBIT 4
Page 592 of 663

TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1
1.1	Introduction	1
1.2	Facility Description	1
2.0	RESULTS	1
2.1	Lead Survey Procedures	1
2.2	Identified Suspect Lead-Containing Paint	2
	Table 2.2-1 — Summary of Analytical Results	
3.0	CONCLUSIONS AND RECOMMENDATIONS	4
4.0	LIMITATIONS AND CONDITIONS	5
APPENDICES		
	Appendix A – Analytical Results and Chain of Custody	
	Appendix B – Personnel and Laboratory Qualifications	
	Appendix C – Photographs	

1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

On July 1, 2015, a lead-containing paint survey was conducted at Pump Station A-12, located on 900 Avocado Isle in Fort Lauderdale, Florida. The survey included six (6) samples of walls, piping and valve associated with the pump station. The survey was performed by Mr. Brandon Christensen, with GLE.

1.2 FACILITY DESCRIPTION

A summary of the facility investigated is outlined in the table below.

Facility Type:	Pump Station
----------------	--------------

2.0 RESULTS

2.1 LEAD SURVEY PROCEDURES

It is GLE's understanding that the survey was conducted to provide information needed to comply with 29 CFR Part 1926 "Lead Exposure in Construction; Interim Final Rule" for future demolition and/or renovation activities. The Scope of the "Lead Exposure in Construction; Interim Final Rule" "applies to all occupational exposure to lead in all construction work in which lead, in any amount, is present in an occupationally related context." Due to the lack of a firm correlation between lead levels in paint and airborne lead levels during construction activities, OSHA has developed task-related triggers that require the implementation of the provisions required in 29 CFR Part 1926. Demolition and/or renovation activities involve tasks covered under this standard.

The survey was performed by observing and testing accessible painted component surfaces of the building. After the overall visual survey was completed, an inventory of painted surfaces was developed. The surveyor then subdivided the areas into homogeneous areas of apparent similar paint history.

After the overall visual survey was completed, an inventory of painted surfaces was developed. The surveyor then subdivided the areas into homogeneous areas of apparent similar paint history. At this time, there are no specific notification requirements or requirements for removal prior to renovation/demolition associated with lead paint.

Sampling of the paint surfaces was performed by collecting a representative paint chip. The sample was submitted to Environmental Hazards Services, LLC, an accredited laboratory recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP), located in Richmond, Virginia. The sample was analyzed by EPA Method SW 846 7000B and the results are reported in percentage of lead by weight of the paint sample (% Wt).

2.2 IDENTIFIED SUSPECT LEAD-CONTAINING PAINT

A total of six (6) samples of suspect lead-containing paint were collected from the facility during the survey. The results of the laboratory analyses are included in Appendix A. Photographs of the coating sampled are included in Appendix C.

A summary of the paint chip sample analytical results is outlined in the following table:

TABLE 2.2-1: SUMMARY OF ANALYTICAL RESULTS PUMP STATION A-12 – 900 AVOCADO ISLE FORT LAUDERDALE, FLORIDA							
SAMPLE #	BUILDING	INTERIOR OR EXTERIOR	LOCATION	COMPONENT	COLOR	LEAD CONCENTRATION (% BY WEIGHT)	ESTIMATED QUANTITY
PC-01	Pump Station	Exterior	Concrete	Concrete	White	0.0020	60 sq. feet
PC-02	Pump Station	Interior	Pipe	Metal	Green	0.049	10 linear feet / (1.5' diameter)
PC-03	Pump Station	Interior	Pump	Metal	Grey	0.027	4 pumps / 16 sq. feet
PC-04	Pump Station	Interior	Pipe	Metal	Black	0.61	30 linear feet / (1.5' Diameter)
PC-05	Pump Station	Interior	Valve	Metal	Blue	<0.046	n/a
PC-06	Pump Station	Interior	Pipe	Metal	Grey	0.28	4 linear feet (2' diameter)

1 **BOLD** result indicates lead-containing paint.

2 The requirements of the OSHA Lead in Construction Standard 29CFR 1926.62 are invoked if any amount of lead is present in the sample; there is no minimum concentration.

³Please note that the quantities outlined above reflect field verification of observed materials. The abatement contractor is responsible for verifying bid quantities.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Analytical results indicate that five (5) of the six (6) painted surfaces tested contains a concentration (% by weight) of lead within the paint greater than the laboratory's detection limit.

Under the present OSHA lead construction standard, **any identified lead-containing paint affected by construction activities falls under the requirements of 29 CFR 1926, there are no quantity threshold exemptions.** There are no current government guidelines defining a lead paint concentration that creates a hazardous atmosphere when disturbed. Based on current OSHA guidelines, for those employees who will be disturbing lead-containing paint, their employer must conduct a negative exposure assessment (NEA) by monitoring employee exposure to determine if any employee is exposed to lead at or above 30 ug/m³ (8-hour TWA). Based on current OSHA guidelines, there are two options for proper handling of lead painted materials that will be disturbed during renovation/demolition activities, i.e.: (1) abatement of the materials prior to performance of the work; or (2) conductance of a negative exposure assessment (NEA).

The employer must implement OSHA prescribed protective measures until they can demonstrate that the employee exposure is not in excess of the action level. For any planned demolition or renovations to any facilities which contain lead-based paint, GLE recommends the following:

Abatement Option: Although there is no state or federal requirement for removal of lead paint prior to renovation/demolition, abatement by a trained professional prior to renovation/demolition would eliminate the need for an NEA by the demolition contractor. For all identified lead painted materials where abrasive blasting, welding, cutting and/or torch burning are planned: removal of lead paint by a properly trained lead removal contractor at select locations where these activities are planned.

NEA Option: If abatement is not performed prior to demolition, the employer must implement OSHA prescribed protective measures until they can demonstrate that employee exposure is not in excess of the action level. For those employees who will be disturbing lead-containing paint, their employer must conduct an NEA by monitoring employee exposure to determine if any employee is exposed to lead at or above 30 ug/m³ (8-hour Time Weighted Average (TWA)).

For all identified lead painted materials where manual demolition (e.g. drywall) manual scraping, manual sanding and heat gun applications are planned: provide workers with interim protection as outline in the OSHA Lead Construction Standard until the employee exposure monitoring indicate that that all tasks being performed are not exposing employees above the Permissible Exposure Limit (PEL).

The interim employee protection measures include but are not limited to the following: appropriate respiratory protection; appropriate personal protective clothing and equipment; change areas; hand washing facilities; biological monitoring; and training.

In accordance with the EPA, all waste generated during lead paint removal and subsequent manual demolition and/or renovation activities must be collected, containerized, sampled and characterized by Toxicity Characteristic Leaching Procedure (TCLP) testing for lead for waste disposal purposes.

4.0 LIMITATIONS AND CONDITIONS

Due to the inaccessibility of some building elements, e.g., painted surfaces on the sub-grade exterior of the pump station, etc. it is conceivable that all potential lead-containing paint within the extents of this survey may not have been located and identified. We do warrant, however, that the investigations and methodology reflect our best efforts based upon the prevailing standard of care in the environmental industry.

APPENDIX A

Analytical Results and Chain of Custody



Environmental Hazards Services, L.L.C.
 7469 Whitepine Rd
 Richmond, VA 23237
 Telephone: 800.347.4010

Lead Paint Chip Analysis Report

Report Number: 15-07-00633

Client: GLE Associates (Jacksonville)
 4300 W. Cypress Street
 Suite 400
 Tampa, FL 33607

Received Date: 07/03/2015
 Analyzed Date: 07/07/2015
 Reported Date: 07/08/2015

Project/Test Address: Pump Station A-12 (Avocado Isle); Ft. Lauderdale, FL
 Collection Date: 07/01/2015

Client Number:
 10-4022

Laboratory Results

Fax Number:
 954-968-6090

Lab Sample Number	Client Sample Number	Collection Location	Pb (ug/g) ppm	% Pb by Wt.	Narrative ID
15-07-00633-001	PC-01	EXT. CONCRETE	200	0.020	
15-07-00633-002	PC-02	PIPE	490	0.049	
15-07-00633-003	PC-03	PUMP	270	0.027	
15-07-00633-004	PC-04	PIPE	6100	0.61	
15-07-00633-005	PC-05	VALVE	<46	<0.0046	
15-07-00633-006	PC-06	PIPE	2800	0.28	

City of Fort Lauderdale
Environmental Hazards Services, L.L.C

Bid 663-11778

Client Number: 10-4022

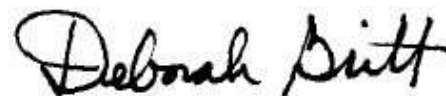
Report Number: 15-07-00633

Project/Test Address: Pump Station A-12 (Avocado Isle); Ft. Lauderdale, FL

Lab Sample Number	Client Sample Number	Collection Location	Pb (ug/g) ppm	% Pb by Wt.	Narrative ID
-------------------	----------------------	---------------------	------------------	-------------	--------------

Method: EPA SW846 7000B

Reviewed By Authorized Signatory:



Deborah Britt
 QA/QC Clerk

The HUD lead guidelines for lead paint chips are 0.50% by Weight, 5000 ppm, or 1.0 mg/cm². The Reporting Limit (RL) is 10.0 ug Total Pb. Paint chip area and results are calculated based on area measurements determined by the client. All internal quality control requirements associated with this batch were met, unless otherwise noted.

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, etc., was provided by the client. Results reported above in mg/cm³ are calculated based on area supplied by client. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714.

LEGEND	Pb= lead	ug = microgram	ppm = parts per million
	ug/g = micrograms per gram	Wt. = weight	



Laboratories™

Environmental Hazards Services, LLC

www.leadlab.com 7469 Whitepine Rd
(800) 347-4010 Richmond, VA
(804) 275-4907 (fax) 23237

Lead Chain-of-Custody

15-07-00633



Due Date:
07/08/2015
(Wednesday)

AE

[Signature]

Company Name: GLE Associates, Inc. Address: 10000 NW 65th Street, Suite 100 City/State/Zip: Fort Lauderdale, Florida
Phone: (954) 968-6414 Fax: (954) 968-6090 E-mail: jsimmons@gleassociates.com Acct. Number: 10-4022
Project Name / Testing Address: Pumpstation A-12 (Avocado Isle) City/State (Required): FL, Lauderdale, FL
Collected by: Brandon Christensen Certification Number: FL-R-120502-1 Purchase Order Number: 15000-15360

* Do wipe samples submitted meet ASTM E1792 requirements? Yes ☐ No ☐

Turn Around Time (TAT) <input type="checkbox"/> 1-Day <input type="checkbox"/> 3-Day <input type="checkbox"/> Same Day (Must Call Ahead) <input type="checkbox"/> Weekend (Must Call Ahead) If no TAT is specified, sample(s) will be processed and charged as 3-Day TAT.	Sample Type Single Dust Wipe = DW Soil = S Paint Chip = PC Air = A Composite Soil = CS	Abbreviations FR = Family Room F = Front O = Basement LR = Living Room R = Rear KT = Kitchen DN = Den LT = Left BA = Bath DR = Dining Room RT = Right BR = Bedroom 1 = 1st Fl 2 = 2nd Fl	Surface Type for Dust Wipe FL = Floor CP = Carpet SL = Window Sill WW = Window Well
--	--	--	--

No.	Sample Type	Date Collected	Client Sample ID	Collection Location (LR, KT, LTFBR, RTRBR, etc.)	Surface Type	Area	Paint Chip			Air			Comments
						Length X Width in inches (Provide paint chip area only if requesting mg/cm2)	mg/cm ²	PPM	%	Flow Rate (L/min)	Total Time (minutes)	Volume (Total Liters)	
1	PC	7-1-15	PC-01	Ed. Concrete		X			✓				White
2			PC-02	Pipe		X			✓				Green
3			PC-03	Pump		X			✓				Grey
4			PC-04	Pipe		X			✓				Black
5			PC-05	Valve		X			✓				Blue
6			PC-06	Pipe		X			✓				Grey
7						X							
8						X							
9						X							
10						X							
Released by: <u>Brandon Christensen</u>						Signature: <u>[Signature]</u>			Date/Time: <u>7-1-15</u>				
Received by: <u>Tisha</u>						Signature: <u>[Signature]</u>			Date/Time: <u>7/3/15</u>				

CAM 16-1224
EXHIBIT 4
Page 602 of 663

APPENDIX B

Personnel and Laboratory Qualifications

United States Environmental Protection Agency

This is to certify that

GLE Associates, 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:

Florida

This certification is valid from the date of issuance and expires March 03, 2018

FL-2060-5

Certification #

January 15, 2015

Issued On



Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that



Brandon Christensen

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 as:

Risk Assessor

In the Jurisdiction of:

Florida

This certification is valid from the date of issuance and expires February 28, 2018

FL-R-120502-2

Certification #

February 17, 2015

Issued On



Adrienne Priselac, Manager, Toxics Office

Land Division



**COMMONWEALTH OF VIRGINIA
DEPARTMENT OF GENERAL SERVICES
DIVISION OF CONSOLIDATED LABORATORY SERVICES**



Certifies that

**VA Laboratory ID#: 460172
Environmental Hazards Services, L L C
7469 Whitepine Road
Richmond, VA 23237**

Owner: ROBERT GELBACH/NATIONAL TESTING LABORATORIES

Operator: HOWARD VARNER

Responsible Official: HOWARD VARNER

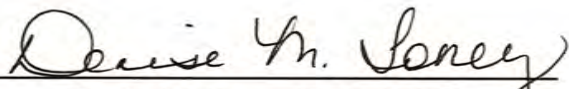
Having met the requirements of 1 VAC 30-46
and the National Environmental Laboratory Accreditation Conference 2003 Standard
is hereby approved as an
Accredited Laboratory

As more fully described in the attached Scope of Accreditation

Effective Date: **December 15, 2014**

Expiration Date: **December 14, 2015**

Certificate # 7580


Denise M. Toney, Ph.D., HCLD
DGS Deputy Director for Laboratories

Continued accreditation status depends on successful ongoing participation in the program.
Certificate to be conspicuously displayed at the laboratory.
Not valid unless accompanied by a valid Virginia Environmental Laboratory Accreditation Program (VELAP)
Scope of Accreditation.
Customers are urged to verify the laboratory's current accreditation status.

Certificate Not Transferable

Surrender Upon Revocation
CAM 16-1224
EXHIBIT 4
Page 606 of 663



Scope of Accreditation

VELAP Certificate No.: 7580

Environmental Hazards Services, L L C
 7469 Whitepine Road
 Richmond, VA 23237

Virginia Laboratory ID: 460172
 Effective Date: December 15, 2014
 Expiration Date: December 14, 2015

NON-POTABLE WATER

<u>METHOD</u>	<u>ANALYTE</u>	<u>PRIMARY</u>	<u>METHOD</u>	<u>ANALYTE</u>	<u>PRIMARY</u>
EPA 6010 C	ALUMINUM	VA	EPA 6010 C	ANTIMONY	VA
EPA 6010 C	ARSENIC	VA	EPA 6010 C	BARIUM	VA
EPA 6010 C	BERYLLIUM	VA	EPA 6010 C	CADMIUM	VA
EPA 6010 C	CHROMIUM	VA	EPA 6010 C	COBALT	VA
EPA 6010 C	COPPER	VA	EPA 6010 C	IRON	VA
EPA 6010 C	LEAD	VA	EPA 6010 C	MANGANESE	VA
EPA 6010 C	MOLYBDENUM	VA	EPA 6010 C	NICKEL	VA
EPA 6010 C	SELENIUM	VA	EPA 6010 C	SILVER	VA
EPA 6010 C	THALLIUM	VA	EPA 6010 C	VANADIUM	VA
EPA 6010 C	ZINC	VA	EPA 7000 B	LEAD	VA
EPA 7470 A	MERCURY	VA			

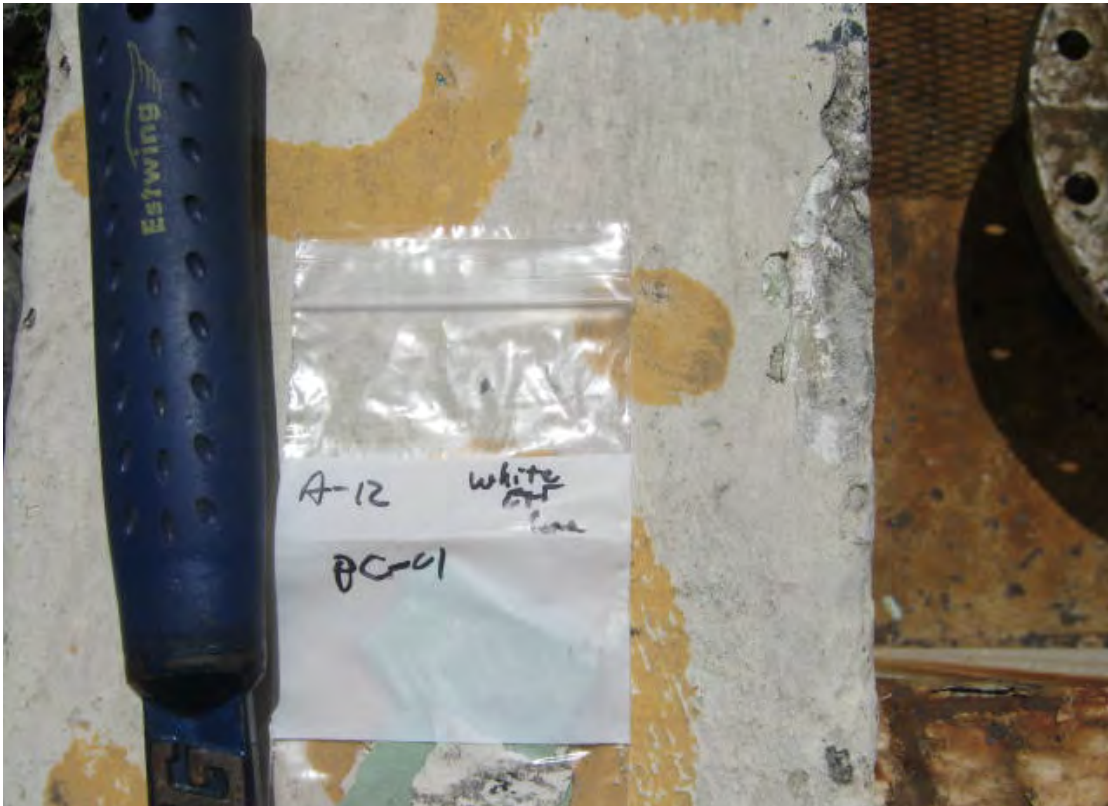
SOLID AND CHEMICAL MATERIALS

<u>METHOD</u>	<u>ANALYTE</u>	<u>PRIMARY</u>	<u>METHOD</u>	<u>ANALYTE</u>	<u>PRIMARY</u>
EPA 1311	PREP: TOXICITY CHARACTERISTIC LEACHING PROCEDURE	VA	EPA 3010 A	PREP: ACID DIGESTION OF AQUEOUS SAMPLES AND EXTRACTS FOR TOTAL METALS	VA
EPA 3050 B	PREP: ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS	VA	EPA 3540 C	PREP: SOXHLET EXTRACTION	VA
EPA 3550 C	PREP: ULTRASONIC EXTRACTION	VA	EPA 3580 A	PREP: WASTE DILUTION	VA
EPA 600/R-93/116	ASBESTOS	VA	EPA 6010 C	ALUMINUM	VA
EPA 6010 C	ANTIMONY	VA	EPA 6010 C	ARSENIC	VA
EPA 6010 C	BARIUM	VA	EPA 6010 C	BERYLLIUM	VA
EPA 6010 C	CADMIUM	VA	EPA 6010 C	CHROMIUM	VA
EPA 6010 C	COBALT	VA	EPA 6010 C	COPPER	VA
EPA 6010 C	IRON	VA	EPA 6010 C	LEAD	VA
EPA 6010 C	MAGNESIUM	VA	EPA 6010 C	MANGANESE	VA
EPA 6010 C	MOLYBDENUM	VA	EPA 6010 C	NICKEL	VA
EPA 6010 C	SELENIUM	VA	EPA 6010 C	SILVER	VA
EPA 6010 C	THALLIUM	VA	EPA 6010 C	TITANIUM	VA
EPA 6010 C	VANADIUM	VA	EPA 6010 C	ZINC	VA
EPA 7000 B	LEAD	VA	EPA 7471 B	MERCURY	VA
EPA 8082 - OIL A	AROCLOR-1016 (PCB-1016)	VA	EPA 8082 - OIL A	AROCLOR-1221 (PCB-1221)	VA
EPA 8082 - OIL A	AROCLOR-1232 (PCB-1232)	VA	EPA 8082 - OIL A	AROCLOR-1242 (PCB-1242)	VA
EPA 8082 - OIL A	AROCLOR-1248 (PCB-1248)	VA	EPA 8082 - OIL A	AROCLOR-1254 (PCB-1254)	VA
EPA 8082 - OIL A	AROCLOR-1260 (PCB-1260)	VA	EPA 8082 A	AROCLOR-1016 (PCB-1016)	VA
EPA 8082 A	AROCLOR-1221 (PCB-1221)	VA	EPA 8082 A	AROCLOR-1232 (PCB-1232)	VA
EPA 8082 A	AROCLOR-1242 (PCB-1242)	VA	EPA 8082 A	AROCLOR-1248 (PCB-1248)	VA
EPA 8082 A	AROCLOR-1254 (PCB-1254)	VA	EPA 8082 A	AROCLOR-1260 (PCB-1260)	VA

This Scope of Accreditation must accompany the Certificate issued by Virginia DCLS with the same Certificate Number indicated above.

APPENDIX C

Photographs



Upper Photo:
Pump Station A-12

Lower Photo:
PC-01 Exterior Concrete

Photograph Date:
July 1, 2015

Prepared By: GLE Associates, Inc.
1000 NW 65th Street - Suite #100
Fort Lauderdale, FL 33309



Pump Station A-12
Fort Lauderdale, Florida

Drawn BSC	Job # 15000-15360
Checked MBC	Figure

Date 07/13/2015	C-1
--------------------	-----

CAM 46 4224

EXHIBIT 4

Page 609 of 663



Upper Photo:
PC-02 Interior Metal Pipe

Lower Photo:
PC-03 Interior Metal Pump

Photograph Date:
July 1, 2015

Prepared By: GLE Associates, Inc.
1000 NW 65th Street - Suite #100
Fort Lauderdale, FL 33309



Pump Station A-12
Fort Lauderdale, Florida

Drawn BSC	Job # 15000-15360
Checked MBC	Figure

Date 07/13/2015	C-2
--------------------	-----

CAM 46 4224

EXHIBIT 4

Page 610 of 663



Upper Photo:
PC-04 Interior Metal Pipe

Lower Photo:
PC-05 Interior Metal Valve

Photograph Date:
, 2015

Prepared By: GLE Associates, Inc.
1000 NW 65th Street - Suite #100
Fort Lauderdale, FL 33309



Pump Station A-12
Fort Lauderdale, Florida

Drawn	Job #
BSC	15000-15360
Checked	Figure
MBC	

Date	
07/13/2015	C-3

CAM 46 4224

EXHIBIT 4

Page 611 of 663



Upper Photo:
PC-06 Interior Metal Pipe

Photograph Date:
July 1, 2015

Prepared By: GLE Associates, Inc.
1000 NW 65th Street - Suite #100
Fort Lauderdale, FL 33309

Pump Station A-12
Fort Lauderdale, Florida

Drawn	Job #
BSC	15000-15360
Checked	Figure
MBC	

Date:
07/13/2015

C-4

CAM 46 4224

EXHIBIT 4

Page 612 of 663

TERMS and CONDITIONS

TERMS and CONDITIONS

SGF Environmental Consultants, Inc. (Company) proposes to perform the services described in the attached Work Plan at a charge pursuant to the attached Fee Schedule and under the conditions and circumstances as are set forth herein as follows:

1. Billings/Payment: Invoices for Company's services shall be submitted at Company's option, either upon completion of such services or at the end of each calendar month, and mailed to Client at the address indicated in the attached Work Plan. All such invoices shall be payable upon receipt, and in the event that payment is not duly made within thirty (30) days, the outstanding balance shall bear interest at the rate of one and a half (1.5%) per month from date of original billing or at the highest interest rate permitted by law, whichever is less. It is further understood and agreed that if Client fails to pay any invoice due to Company within thirty (30) days after the date thereof, Company, without waiving any other claim or right against Client, and without liability whatsoever to Client, may terminate its performance hereunder. In the event that Company places any invoice which is unpaid after the due date, with an agency or an attorney for collection, Client shall pay all costs and expenses of such collection, including without limitation attorney's fees and court costs, if any.

2. Limitations: Client recognizes that Company's services are solely for the benefit of the Client, addressee and lender, and that any person or party designated by Client to receive information regarding work for Client may not do so without the express written consent of Company, and shall be subject to the SGF terms and conditions without modification. Company also recognizes that Company's services require decisions which are not based upon pure science but rather on judgmental considerations. Company shall perform its services in accordance with generally accepted practices. Client agrees that such services shall be rendered without any warranty, expressed or implied, and that Company shall be responsible solely for its own negligence.

3. Professional Liability: Client agrees to assume the defense of and to indemnify and hold harmless to such extent as will limit any and all liability, claims for damages, cost of defense, or expenses which may be brought, levied against, or incurred by Company on account of any claimed error, omission, or negligence to a sum not to exceed the aggregate of Company invoices submitted hereunder. Client further agrees to notify contractor or subcontractor who may perform work in connection with any report or study prepared by Company, of such limitation of Professional Liability for errors, omissions, or professional negligence, and to require, as a condition precedent of their performing work, a like indemnity and limitation of liability on their part as against Company. In the event that Client fails to obtain a like indemnity and limitation of liability, any liability of Company to such contractor or subcontractor arising out of alleged error, omissions or professional negligence shall be allocated between Client and Company in such a manner that the aggregate liability of the Company to all parties, including client, shall not exceed the aggregate amount of invoices submitted hereunder. If any controversy or claim arises out of or relates to this contract, or breach thereof, and if said dispute can not be settled through negotiation, the parties shall submit to binding arbitration in accordance with the Construction Industry Arbitration Rules of the AAA, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

In the event that the Client makes claim against Company, at Law or otherwise, for any alleged error, omission, or act arising out of the performance of Company's services, and the Client fails to prove such claim upon final adjudication, then the Client shall pay all costs incurred by Company in defending itself against such claim, including, without limitation, personnel-related costs, attorneys' fees, court costs, and other claim-related expenses, including, without limitation, costs, fees and expenses of experts.

Company will not be liable for damage or injury arising from damage to or interference with subterranean structures (including without limitation, pipes, tanks, telephone cables, etc.) which are not called to Company's attention and not correctly shown on the plans furnished by Client in connection with work performed under this Work Plan.

4. Warranty: Consultant's makes no warranty, either expressed or implied, as to Consultant's findings, recommendations, plans, specifications, or professional advice. Consultant has endeavored to perform its services in accordance with generally accepted standards of practice in effect at the time of performance. Client recognizes that neither Consultant nor any of Consultant's subconsultants or subcontractors owes any fiduciary responsibility to client.

5. Right of Entry: Client hereby grants to Company or represents and warrants (if the project location is not owned by Client) that permission has been duly granted for the Right of Entry from time to time, by Company, its agents, staff, consultants, and contractors or subcontractors, upon the project location for the purpose of performing and with the right to perform all acts, studies, and research, including without limitation the making of test borings and other soil and water samplings, pursuant to the Work Plan.

The Client hereby recognizes that as part of conductance of the work scope, certain sampling procedures will result in collection of development/purge water and soil cuttings to be stored on site in clean containers until subsequent laboratory analysis is complete. Client recognizes that said containers, soils and ground water are the property of the property owner and must be disposed by the property owner according to applicable laws, at their own expense.

The Client hereby recognizes that the use of exploration equipment may unavoidably affect, alter, or damage the terrain and affect vegetation, buildings, structures, and equipment in, at, or upon the study area. Client accepts the fact that this is inherent to Company's work and will not hold Company liable or responsible for any such reasonable effect, alteration or damage.

6. Public Liability: Company represents and warrants that its staff is protected by Worker's Compensation insurance with statutory limits; and that Company has such coverage under Public Liability and Property Damage insurance policies which Company deems adequate. Certificates for all such policies of insurance shall be provided to Client upon written request. Only within and only to the extent of the limits and conditions of such insurance, Company agrees to indemnify and save Client harmless from any claims, demands, suits, or liabilities arising from any negligent acts by Company, its agents, staff, contractors or consultants employed or engaged by it. In no event shall Company be liable or responsible for any loss, damage, or liability, including but not limited to fire and explosion, beyond the amounts, limits, and conditions of such insurance, or if such loss, damage, or liability is excluded from such coverage of such insurance.

7. Duty of Client: Client agrees to defend and save Company harmless from all liability, claims, demands, and suits, including expenses of suit and reasonable attorneys' fees, arising from personal injuries, including disease and/or death, property loss or damage, injuries to others (including personnel of Client and of Company, its contractors and subcontractors performing work hereunder), or from air, water, or ground pollution or environmental degradation arising out of or in any manner connected with or related to the performance of this Work Plan, except if such injury, loss, or damage shall be caused by the sole negligence or willful misconduct of Company, its employees, agents, or representatives.

It shall be the duty of Client to advise Company promptly of any known or reasonably knowable hazardous substances or any condition existing in, on, or near the premises upon which work is to be performed by Company's employees or subcontractors that presents a potential or possible health hazard or nuisance. If Client fails to advise Company or, notwithstanding such advice, unanticipated occurrences of such substances or conditions are discovered during the course of the work, and such discovery in the judgment of Company results in or may result in injury or a health risk to persons, whether Company's personnel, Client's personnel, or others, Client agrees that it shall assume full responsibility and liability and shall hold Company harmless from any or all claims, demands, suits, or liabilities for personal injury including disease, medical expenses, including but not limited to continued health monitoring and/or death, property damage, economic loss, including consequential damages.

If any unforeseen hazardous substances or other unforeseen conditions are encountered during execution of the work which, in the judgment of the Company, significantly affect or may affect the work or the recommended Work Plan, Company will notify Client as soon as practicable. In that event, Client and Company agree to pursue one of the following: (1) If practicable, in the judgment of the Company, complete the original Work Plan; (2) Modify the Work Plan and budget estimate to include study of the previously unforeseen conditions, with this Contact being amended accordingly and in writing; or (3) Terminate the Work Plan. In the event of termination, Client agrees to pay Company in full for all work completed and fees due until written termination notice has been received by Company and to pay all costs incurred by Company prior to and in connection with discontinuing the work hereunder, such as completion of files and preparation of a written report to Client of findings to date of termination and all costs associated with subcontract termination.

8. Confidentiality: Company will not knowingly release information regarding work for client, except for information that is in the public domain or is provided by third parties, to any person other than Client and to persons designated by Client. Company may notify Client of conditions, if identified, which in Company's professional opinion, may present a potential public health or public safety hazard. It is the Client's responsibility to release and to notify appropriate public agencies in a timely manner of any information that may be necessary to preserve public health or public safety or in order to limit future public risks. Client agrees to hold Company harmless against any and all claims, demands, suits, or liabilities as a consequence of release of the information which may be necessary to preserve public health or safety. Notwithstanding the above, Company will exercise its best efforts to comply with any federal, state, county, or municipal law, regulation, ordinances, or legal obligations regarding the reporting of findings to appropriate public agencies. Client agrees to hold Company harmless against any and all claims, demands, suits or liabilities resulting from such actions by Company.

9. Opinions of Probable Clean-up and Disposal Costs: The Company may give opinions of probable clean-up and disposal costs as part of the Work Plan. These opinions may also involve approximate quantity estimates. The Client understands and agrees that quantity estimates are not accurate enough for clean-up and disposal bids. Company does not guarantee or warrant the accuracy of estimates of probable clean-up and disposal costs as compared to bids of Contractors, or compared to actual clean-up and disposal costs.

10. Documents: All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by Company as instruments of service shall remain the property of Company. Client agrees that all reports and other work furnished to Client or its agents, shall be utilized by the Client solely for the purposes of the contemplated project. Any documents prepared by Company which are not paid for by Client, shall be returned upon demand and shall not be used by Client for any purpose whatsoever. The Company will retain all pertinent records relating to performed services for a period of two (2) years following submission of the report, during which period the records will be made available to the Client at Company's Office at all reasonable times. Copies will be prepared by Company for Client for reasonable cost of reproduction.

11. SGF Environmental Consultants, Inc. is an Equal Opportunity Employer.

ELECTRICAL SCHEDULE OF VALUES

The following is a Schedule of Values for Unit items that have been used in this project. These values include the costs of material, labor, equipment and overhead. If extra work is added, or part of the work deleted, the values will be used to justify all changes.

Contractor shall complete all items in the Schedule of Values. These items are not part of the bid price.

ITEM	DESCRIPTION	UNIT	UNIT PRICE
1	600 AMP/480v/277v/39, NEMA 3R meter can with 3 CT	EA	\$ <input type="text"/>
2	600A AMP/480/277/60 KA1C/NEMA 3 Outdoor Floor mounted main breaker	EA	\$ <input type="text"/>
3	600A AMP/480v/277v/60 KA1C/3Phase/NEMA 3R, Floor mounted auto transfer switch with manual bypass	EA	\$ <input type="text"/>
4	600A AMP/480/277v/60 KAIC/3Phase/tinned-copper Bus Bar/NEMA 4X, distribution panel with seven (7) circuit breakers and TVSS per drawing E-3	EA	\$ <input type="text"/>
5	100 AMPS/480v/277v/3Phase/NEMA 3R Soft Starter	EA	\$ <input type="text"/>
6	30 KVA/480v/208v/120v/3Phase/ NEMA 3R Floor-mounted	EA	\$ <input type="text"/>
7	100 AMP/208v/120v/NEMA 3R/tinned-copper bus bar with thirty (30) breaker, wall-mounted per "LDP" panel schedule	EA	\$ <input type="text"/>
8	4 x 350 MCM THNN copper in 3 1/2" PVC SCH 80 @ 29" depth trench	LF	\$ <input type="text"/>
9	4 x 500 MCM + 1 x #1/0 THNN copper in 3 1/2" conduit PVC Sch. 80.	LF	\$ <input type="text"/>
10	3 x #1/0 + 1 x #6 THNN copper in 2" conduit PVC Sch. 80	LF	\$ <input type="text"/>
11	Control panel/NEMA 4X/wall-mounted, per drawings E-7 and E-8	UNIT	\$ <input type="text"/>
12	200A x /480v/3Phase disconnect/NEMA 3R, with safety lock	UNIT	\$ <input type="text"/>

All of the above items must be completed. Failure to do so will result in the bid being considered non-responsive.



QUESTIONNAIRE SHEET

PLEASE PRINT OR TYPE:

Firm Name:

President

Business Address:

Telephone:

Fax:

E-Mail Address:

What was the last project of this nature which you completed?

	5
	6

The following are named as three corporations and representatives of those corporations for which you have performed work similar to that required by this contract, and which the City may contact as your references (include addresses and telephone numbers):

	5
	6

How many years has your organization been in business?

Have you ever failed to complete work awarded to you; if so, where and why?

The name of the qualifying agent for the firm and his position is:

Certificate of Competency Number of Qualifying Agent:

Effective Date:

Expiration Date:

Licensed in:

Contractor's License #(s)

(County/State)

Expiration Date:

NOTE: To be considered for award of this contract, the bidder must submit a financial statement upon request.

Contractor must have proper licensing prior to submitting bid and must submit evidence of same with bid.

QUESTIONNAIRE SHEET

1. Have you personally inspected the proposed work and have you a complete plan for its performance?

	5
	6

2. Will you sublet any part of this work? If so, list the portions or specialties of the work that you will.

a)	
b)	
c)	
d)	
e)	
f)	
g)	

3. What equipment do you own that is available for the work?

	5
	6

4. What equipment will you purchase for the proposed work?

	5
	6

5. What equipment will you rent for the proposed work?

	5
	6

5

TRENCH SAFETY

Bidder acknowledges that included in the appropriate bid items of his bid and in the Total Bid Price are costs for complying with the Florida Trench Safety Act, Florida Statutes 553.60 – 553.64. The bidder further identifies the costs of such compliance to be summarized below:

Trench Safety Measure (Description)	Units of Measure (LF/SF)	Unit (Quantity)	Unit Cost	Extended Cost
A. <input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
B. <input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
C. <input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
D. <input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>

Total: \$

The bidder certifies that all trench excavation done within his control in excess of five feet (5') in depth shall be in accordance with the Occupational Safety and Health Administration's excavation safety standards, C.F.R. s. 1926.650 Subpart P., and the Florida Trench Safety Act, Florida Statutes 553.60-553.64.

Failure to complete the above may result in the bid being declared non-responsive.

DATE:
(SIGNATURE)

STATE OF: COUNTY OF:

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

(Name of Individual Signing)

who, after first being duly sworn by me,
 affixed his/her signature in the space provided above on this
 day of , 20 .

NOTARY PUBLIC

My Commission Expires:

6

5

NON-COLLUSION STATEMENT:

By signing this offer, the vendor/contractor certifies that this offer is made independently and *free* from collusion. Vendor shall disclose below any City of Fort Lauderdale, FL officer or employee, or any relative of any such officer or employee who is an officer or director of, or has a material interest in, the vendor's business, who is in a position to influence this procurement.

Any City of Fort Lauderdale, FL officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement.

For purposes hereof, a person has a material interest if they directly or indirectly own more than 5 percent of the total assets or capital stock of any business entity, or if they otherwise stand to personally gain if the contract is awarded to this vendor.

In accordance with City of Fort Lauderdale, FL Policy and Standards Manual, 6.10.8.3,

3.3. City employees may not contract with the City through any corporation or business entity in which they or their immediate family members hold a controlling financial interest (e.g. ownership of five (5) percent or more).

3.4. Immediate family members (spouse, parents and children) are also prohibited from contracting with the City subject to the same general rules.

Failure of a vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the City Procurement Code.

NAME**RELATIONSHIPS**

-

In the event the vendor does not indicate any names, the City shall interpret this to mean that the vendor has indicated that no such relationships exist.

6

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT

MINORITY BUSINESS ENTERPRISE (MBE) - WOMEN BUSINESS ENTERPRISE (WBE)

PRIME CONTRACTOR IDENTIFICATION FORM

In order to assist us in identifying the status of those companies doing business with the City of Fort Lauderdale, this form must be completed and returned with your bid package.

Name of Firm:	<input type="text"/>
Address of Firm:	<input type="text"/>
Telephone Number:	<input type="text"/>
Name of Person Completing Form:	<input type="text"/>
Title:	<input type="text"/>
Signature:	<input type="text"/>
Date:	<input type="text"/>
City Project Number:	<input type="text"/>
City Project Description:	<input type="text"/>

Please check the item(s) which properly identify the status of your firm:

- ☐ Our firm is not a MBE or WBE.
- ☐ Our firm is a MBE, as at least 51 percent is owned and operated by one or more socially and economically disadvantaged individuals.
- ☐ American Indian ☐ Asian ☐ Black ☐ Hispanic
- ☐ Our firm is a WBE, as at least 51 percent is owned and operated by one or more women.
- ☐ American Indian ☐ Asian ☐ Black ☐ Hispanic

MBE/WBE CONTRACTOR INFORMATION

The City, in a continuing effort, is encouraging the increased participation of minority and women-owned businesses in Public Works Department related contracts. Along those lines, we are requiring that each firm provide documentation detailing their own programs for utilizing minority and women-owned businesses.

Submit this information as a part of this bid package and refer to the checklist, to ensure that all areas of concern are covered. The low responsive bidder may be contacted to schedule a meeting to discuss these objectives. It is our intention to proceed as quickly as possible with this project, so your cooperation in this matter is appreciated.

CONTRACTOR CHECKLIST

- ☐ List Previous City of Fort Lauderdale Contracts

	5
	6

- ☐ Number of Employees in your firm

--Percent () % Women

--Percent () % Minorities

--Job Classifications of Women and Minorities

	5
	6

- ☐ Use of minority and/or women subcontractors on past projects.

	5
	6

- ☐ Nature of the work subcontracted to minority and/or women-owned firms.

	5
	6

- ☐ How are subcontractors notified of available opportunities with your firm?

	5
	6

☐ Anticipated amount to be subcontracted on this project.

	5
	6

☐ Anticipated amount to be subcontracted to minority and/or women-owned businesses on this project.

	5
	6

6

5

CONTRACT PAYMENT METHOD

The City of Fort Lauderdale has implemented a Procurement Card (P-Card) program which changes how payments are remitted to its vendors. The City is transitioning from traditional paper checks to credit card payments via MasterCard or Visa as part of this program.

This allows you as a vendor of the City of Fort Lauderdale, to receive your payment fast and safely. No more waiting for checks to be printed and mailed.

In accordance with Article 7, item 7.6 of the contract, payments on this contract will be made utilizing the City's P-Card. Accordingly, bidders must presently have the ability to accept these credit cards or take whatever steps necessary to implement acceptance of a card before the start of the contract term, or contract award by the City.

Please indicate with which credit card you prefer to be paid:

☐ Master Card

☐ Visa Card

Company Name:

Signature:

Print Name Title:

6

CONSTRUCTION BID CERTIFICATION

Please Note: All fields below must be completed. If the field does not apply to you, please note N/A in that field. If you are a foreign corporation, you may be required to obtain a certificate of authority from the department of state, in accordance with Florida Statute §607.1501 (visit <http://www.dos.state.fl.us/>).

Company: (Legal Registration)

Address:

City: State: Zip:

Telephone No. FAX No. Email:

Does your firm qualify for MBE or WBE status: MBE ☐ WBE ☐

If a corporation, state the name of the President, Secretary and Resident Agent. If a partnership, state the names of all partners. If a trade name, state the names of the individuals who do business under the trade name.

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Name	Title	Name	Title
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Name	Title	Name	Title

ADDENDUM ACKNOWLEDGEMENT - Bidder acknowledges that the following addenda have been received and are included in the bid:

Addendum No.	Date Received	Addendum No.	Date Received	Addendum No.	Date Received	Addendum No.	Date Received
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

VARIANCES: If you take exception or have variances to any term, condition, specification, or requirement in this bid you must specify such variance in the space provided below or reference in the space provided below all variances contained on other pages within your bid. Additional pages may be attached if necessary. No variances will be deemed to be part of the bid submitted unless such is listed and contained in the space provided below. The City does not, by virtue of submitting a variance, necessarily accept any variances. If no statement is contained in the below space, it is hereby implied that your response is in full compliance with this competitive solicitation. If you do not have variances, simply mark N/A. If submitting your response electronically through BIDS SYNC you must also click the "Take Exception" button.

The below signatory affirms that he has or will obtain all required permits and licenses from the appropriate agencies, and that his firm is authorized to do business in the State of Florida. The below signatory agrees to furnish all labor, tools, material, equipment and supplies, and to sustain all the expense incurred in doing the work set forth in strict accordance with the bid plans and contract documents at the unit prices indicated if awarded a contract. The below signatory has not divulged to, discussed, or compared this bid with other bidders, and has not colluded with any other bidder or parties to this bid whatsoever. Furthermore, the undersigned guarantees the truth and accuracy of all statements and answers contained in this bid. The below signatory also hereby agrees, by virtue of submitting or attempting to submit a bid, that in no event shall the City's liability for bidder's direct, indirect, incidental, consequential, special or exemplary damages, expenses, or lost profits arising out of this competitive solicitation process, including but not limited to public advertisement, bid conferences, site visits, evaluations, oral presentations, or award proceedings exceed the amount of Five Hundred Dollars (\$500.00). This limitation shall not apply to claims arising under any provision of indemnification or the City protest ordinance contained in this competitive solicitation.

Submitted by:

Name (printed)

Date:

Signature

Date:

GENERAL CONSTRUCTION NOTES:

- NO CONNECTIONS FOR THE PURPOSE OF OBTAINING WATER SUPPLY DURING CONSTRUCTION SHALL BE MADE TO ANY FIRE HYDRANT OR BLOW-OFF STRUCTURE WITHOUT FIRST OBTAINING PERMISSION AND A CONSTRUCTION METER FROM THE CITY OF FORT LAUDERDALE.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR LOCATING, MOVING AND RELOCATING OR REPLACING ALL WATER SERVICES OR SEWER LATERALS WHICH ARE ENCOUNTERED DURING EXCAVATION. THE CONTRACTOR SHALL SUBMIT A WRITTEN PLAN FOR WATER SERVICE AND WASTEWATER DISRUPTION FOR APPROVAL 7 (SEVEN) CALENDAR DAYS PRIOR TO THE ANTICIPATED DISRUPTION. THE CONTRACTOR SHALL NOTIFY THE PROPERTY OWNERS 48 HOURS IN ADVANCE OF ANY WORK ON THEIR SERVICES. THIS WORK SHALL BE CONSIDERED INCIDENTAL.
- THE CONTRACTOR MUST USE EXTREME CARE TO AVOID DAMAGE OR DISRUPTION TO ANY EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT. ALL PLAN LOCATIONS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED. CONTRACTOR IS TO CONTACT SUNSHINE STATE ONE CALL OF FLORIDA AT 1-800-432-4770 AND ALL OTHER PARTICIPATING UTILITIES 2 FULL BUSINESS DAYS PRIOR TO CONSTRUCTION FOR FIELD MARKUP LOCATIONS OF EXISTING UTILITIES AND FACILITIES.
- THE CONTRACTOR MUST INFORM THE CITY AT LEAST 48-HOURS IN ADVANCE OF CONSTRUCTION, IN WRITING IF ANY CONFLICT IS DISCOVERED DURING POT HOLE OPERATIONS FOR CLARIFICATION BY THE CITY.
- IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE UTILITIES DEPARTMENT OF THE CITY OF FORT LAUDERDALE AT LEAST TWO (2) BUSINESS DAYS IN ADVANCE TO COORDINATE ANY ACTIVITY TO BE PERFORMED BY THE CITY'S UTILITIES DEPARTMENT.
- CONTRACTOR SHALL NOT DISTURB AREAS OUTSIDE EXISTING RIGHTS-OF-WAY.
- IN GENERAL, EXISTING STRUCTURES AND UTILITIES ARE NOTED AS EXISTING AND/OR SHOWN IN THIN LINES. NEW CONSTRUCTION IS IN HEAVY LINES AND/OR UNDERLINED.
- ALL WORK WITHIN STATE DEPARTMENT OF TRANSPORTATION (FDOT) RIGHT-OF-WAYS SHALL BE IN CONFORMANCE WITH FDOT SPECIFICATIONS AND PERMIT REQUIREMENTS.
- ALL WORK WITHIN BROWARD COUNTY RIGHT-OF-WAYS SHALL BE IN CONFORMANCE WITH THE BROWARD COUNTY MINIMUM STANDARDS AND/OR REQUIREMENTS.
- CONTRACTOR SHALL COMPLY WITH ALL LOCAL CITY, COUNTY AND STATE REGULATIONS PERTAINING TO THE CLOSING OF PUBLIC STREETS FOR USE OF TRAFFIC DURING CONSTRUCTION.
- CONTRACTOR SHALL PREPARE AND SUBMIT MAINTENANCE OF TRAFFIC (MOT) PLANS TO FDOT, CITY OF FORT LAUDERDALE, BROWARD COUNTY AS REQUIRED FOR WORK TO BE DONE WITHIN THEIR R/W PRIOR TO COMMENCEMENT OF WORK. SPECIFIC AGENCY MOT REQUIREMENTS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- STATIONS SHOWN ON THE DRAWINGS ARE BASED ON THE ESTABLISHED BASELINE AND SHALL NOT BE CONSIDERED AS DISTANCES OR AS A MEASURE OF THE LINEAR FOOTAGE OF PIPE TO BE INSTALLED.
- ~~THE GENERAL INTENT IS TO PROVIDE SEWER SERVICE LATERALS FOR EACH PROPERTY. ALL LATERAL LOCATIONS SHALL BE FIELD ADJUSTED.~~
- CONTRACTOR SHALL MAINTAIN ACCESS TO PRIVATE PROPERTY AT ALL TIMES.
- ALL OPEN TRENCHES AND HOLES ADJACENT TO ROADWAY OR WALKWAY SHALL BE PROPERLY MARKED AND BARRICADED TO ASSURE THE SAFETY OF BOTH VEHICULAR AND PEDESTRIAN TRAFFIC.
- TRENCHES OR HOLES NEAR WALKWAYS, IN ROADWAYS OR THEIR SHOULDERS SHALL NOT BE LEFT OPEN DURING NIGHT TIME HOURS WITHOUT ADEQUATE PROTECTION.
- CONTRACTOR SHALL PROMPTLY REPAIR AND RESTORE EXISTING PAVEMENT, SIDEWALKS, CURBS, DRIVEWAYS, PIPES, RESIDENTIAL AND COMMERCIAL SPRINKLER LINES, CONDUIT, CABLES, ETC. AND LANDSCAPE AREAS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL PROVIDE TEMPORARY FENCING AS REQUIRED BY AGENCIES HAVING JURISDICTION OVER THE PROJECT AND/OR WHEN REQUIRED FOR PUBLIC SAFETY.
- THE CONTRACTOR SHALL BE RESPONSIBLE AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION AND UNTIL ACCEPTANCE OF WORK, FOR THE PROTECTION OF EXISTING AND NEWLY INSTALLED UTILITIES FROM DAMAGE OR DISRUPTION OF SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING SUCH MEASURES AS NECESSARY TO PROTECT THE HEALTH, SAFETY AND WELFARE OF THOSE PERSONS HAVING ACCESS TO THE WORK SITE.
- LOCATION OF AIR RELEASE VALVES MAY BE FIELD ADJUSTED BY THE ENGINEER OR CITY OF FORT LAUDERDALE AS NECESSARY.
- CONTRACTOR SHALL ADJUST TO GRADE ALL EXISTING UTILITY CASTINGS INCLUDING VALVE BOXES, MANHOLES, HAND HOLES, PULL BOXES, INLETS AND SIMILAR STRUCTURES IN CONSTRUCTION AREA TO BE OVERLAPPED WITH ASPHALT.
- EXISTING TRAFFIC SIGNS SHALL BE RESET UPON COMPLETION PER BROWARD COUNTY TRAFFIC ENGINEERING STANDARDS. COST SHALL BE CONSIDERED INCIDENTAL. CONTRACTOR SHALL REPAIR OR REPLACE DAMAGED TRAFFIC SIGNAL LOOPS PER BROWARD COUNTY TRAFFIC ENGINEERING SPECIFICATIONS; COST SHALL BE INCIDENTAL.
- CONTRACTOR SHALL RESTORE EXISTING PAVEMENT AND PAVEMENT MARKINGS/SIGNAGE TO ORIGINAL PRE-CONSTRUCTION CONDITION OR AS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS. THIS WORK SHALL BE CONSIDERED INCIDENTAL.
- ALL CONSTRUCTION WITHIN FDOT R/W MUST CONFORM WITH FDOT SPECIFICATIONS, STANDARDS, AND PERMIT REQUIREMENTS. NO WORK SHALL COMMENCE WITHIN FDOT R/W'S WITHOUT AN FDOT PERMIT. FULL LANE WIDTH RESTORATION TO MATCH EXISTING PAVEMENT SECTION IS REQUIRED IN ACCORDANCE WITH FDOT STANDARDS FOR PROPOSED WORK WITHIN FDOT R/W.
- ~~SEWER LATERALS SHALL BE PROVIDED FOR EACH PROPERTY. MISSING SEPTIC TANKS (NOT SHOWN ON SEWER LATERALS SERVICES PLAN) WILL BE FIELD LOCATED AS CONSTRUCTION PROGRESSES AND THE FINAL LATERAL LOCATION (AND TYPE) WILL BE THEN DETERMINED WITH THE APPROVAL OF THE ENGINEER/CITY. SEPTIC TANK LOCATIONS SHOWN IN PLANS ARE APPROXIMATE, BASED ON RESIDENTS SEWER LATERAL QUESTIONNAIRES PROVIDED BY THE CITY.~~
- CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS AND ELEVATIONS BEFORE STARTING CONSTRUCTION.
- ELEVATIONS SHOWN HEREON ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM 1929.

GENERAL NOTES – TRAFFIC CONTROL PLAN

- THE TRAFFIC CONTROL PLANS FOR THE PROJECT SHALL COMPLY WITH THE LATEST EDITION OF THE ROADWAY AND TRAFFIC DESIGN STANDARDS, INDEX NO. 600-660. MUTCD AND THE STANDARD SPECIFICATIONS. THE CONTRACTOR'S RESPONSE TIME TO ALL REPORTED MALFUNCTIONS OF TRAFFIC SIGNALS WITHIN THE PROJECT LIMITS SHALL BE NO MORE THAN TWO (2) HOURS AND SHALL RESTORE ALL MALFUNCTIONING TRAFFIC SIGNAL EQUIPMENT TO ITS LEVEL OF OPERATION PRIOR TO THE MALFUNCTIONING WITHIN TWENTY-FOUR (24) HOURS. DURING THIS TIME THE CONTRACTOR SHALL PROVIDE AT HIS EXPENSE TEMPORARY TRAFFIC CONTROL DEVICES, FLAGGLER PERSONNEL AND LAW ENFORCEMENT PERSONNEL AS NECESSARY TO MAINTAIN A SAFE AND EFFICIENT FLOW OF TRAFFIC AT THE AFFECTED WORK ZONE. THE ENGINEER OR THE CITY OF FORT LAUDERDALE SHALL APPROVE ALL MODIFICATIONS PRIOR TO THEIR IMPLEMENTATION.
- THE CONTRACTOR SHALL MAINTAIN PROPER OPERATION OF ALL TRAFFIC SIGNAL LOOP ASSEMBLIES AND LOOP DETECTORS WITHIN THE PROJECT LIMITS. THE CONTRACTOR SHALL CORRECT ALL LOOP ASSEMBLY/DETECTOR MALFUNCTIONS WITHIN 24 HOURS OF NOTIFICATION OF SUCH MALFUNCTIONS BY THE ENGINEER.
- THE AGENCY RESPONSIBLE FOR MAINTENANCE OF THE TRAFFIC SIGNALS AND RELATED EQUIPMENT IS BROWARD COUNTY TRAFFIC ENGINEERING.
- A REGULATORY SPEED OF 25 MPH SHALL BE POSTED WITHIN THE LIMITS OF THE WORK ZONE.
- EXISTING SIGNS AND PAVEMENT MARKINGS THAT CONFLICT WITH CONSTRUCTION SIGNS AND MARKINGS SHALL BE REMOVED DURING CONSTRUCTION. ALL EXISTING SIGNS THAT ARE REMOVED SHALL BE STOCKPILED IN A SECURE PLACE AND REINSTALLED AFTER CONSTRUCTION. REMOVE AND REPLACE ANY GROUND MOUNT SIGN BY USE OF INDEX NO. 611.
- THE CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGE PATTERNS AND PREVENT ADVERSE FLOODING OF THE TRAVEL LANES DURING CONSTRUCTION.
- THE CONTRACTOR SHALL OBTAIN WRITTEN AUTHORIZATION FROM THE CITY OF FORT LAUDERDALE FOR ANY AND ALL CONSTRUCTION ACTIVITIES TO BE PERFORMED AT NIGHT. NO LANE CLOSURE SHALL BE ALLOWED BETWEEN THE HOURS OF 6:00 AM TO 9:00 AM AND 4:00 PM TO 7:00 PM, MONDAY THROUGH FRIDAY UNLESS APPROVED BY THE ENGINEER.
- THE CONTRACTOR SHALL NOTIFY THE APPROPRIATE UTILITY COMPANY TWO (2) BUSINESS DAYS IN ADVANCE OF ANY EXCAVATION INVOLVING ITS UTILITIES SO THAT A COMPANY REPRESENTATIVE CAN BE PRESENT. THE LOCATION OF THE UTILITIES SHOWN IN THE PLANS ARE APPROXIMATE ONLY. THE EXACT LOCATION SHALL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION. SEE SPECS FOR LIST OF UTILITY COMPANIES.
- TRAFFIC CONTROL ON ALL COUNTY RIGHTS-OF-WAY SHALL MEET THE ADDITIONAL REQUIREMENTS OF THE BROWARD COUNTY ENGINEERING DEPARTMENT.
- THE AGENCY RESPONSIBLE FOR MAINTENANCE OF THE TRAFFIC SIGNALS AND RELATED EQUIPMENT IS BROWARD COUNTY TRAFFIC ENGINEERING.
- CONTRACTOR SHALL PREPARE AND SUBMIT MAINTENANCE OF TRAFFIC PLAN (MOT) WHERE REQUIRED BY FEDERAL, STATE, COUNTY, OR LOCAL AGENCIES HAVING JURISDICTION. CONTRACTOR SHALL OBTAIN ALL REQUIRED APPROVALS AND PERMITS ASSOCIATED WITH THE MOT'S. ALL MOT'S TO BE ATS CERTIFIED.
- THE CONTRACTOR SHALL ALSO COORDINATE THE CONSTRUCTION SCHEDULE WITH FDOT, BROWARD COUNTY AND THE CITY OF FORT LAUDERDALE TO AVOID LANE CLOSURES WHICH WOULD ADVERSELY AFFECT TRAFFIC DURING RUSH HOUR.

GENERAL PRESSURE PIPE NOTES

- THERE SHALL BE 36" MINIMUM COVER FROM FINISHED GRADE TO TOP OF PIPE.
- ALL TRENCHING, PIPE-LAYING, BACKFILL, PRESSURE TESTING MUST COMPLY WITH ALL APPLICABLE FEDERAL, STATE, COUNTY, CITY AND HEALTH DEPARTMENT STANDARDS AND REGULATIONS.
- THESE NOTES AND THE DETAIL SHEETS THAT ACCOMPANY THESE PLANS ARE TYPICAL IN NATURE. THE MAIN PLANS AND SPECIFICATIONS PROVISIONS WILL TAKE PRECEDENCE OVER ANY NOTE CONTAINED ON THIS OR OTHER DETAIL SHEETS.
- THE CONTRACTOR MUST POT HOLE AND VERIFY THE LOCATION, SIZE, AND ELEVATION OF EXISTING PRESSURE MAINS BEFORE MAKING A TIE-IN.

NOTE: CORROSIVE SOIL; DUCTILE IRON PIPE RESISTS CORROSION IN MOST SOILS. THE REMAINING SOILS, CINDERBEDS, POLLUTED RIVER BOTTOMS, ETC., ARE CONSIDERED TO BE POTENTIALLY CORROSIVE SOILS. ENCASE THE PIPE IN 8 MIL THICK POLYETHYLENE AS REQUIRED BY B.C.H.C.E.D.

LEGEND

ABBREVIATIONS

C.L.F.	= CHAIN LINK FENCE
CMP	= CORRUGATED METAL PIPE
CONC.	= CONCRETE
F.H.	= FIRE HYDRANT
GAS	= GAS MAIN
INV.	= PIPE INVERT
OHW	= OVERHEAD WIRES
R/W	= RIGHT-OF-WAY LINE
RCP	= REINFORCED CONCRETE PIPE
SAN	= SANITARY SEWER PIPE
SMH	= SANITARY MANHOLE
S.V.	= SEWER VALVE
T.O.P.	= TOP OF PIPE
UNK.	= UNKNOWN TREE TYPE
U.T.O.	= UNABLE TO OBTAIN DATA
U.V.	= UNKNOWN VALVE
W.V.	= WATER VALVE
B.C.H.C.E.D.	= BROWARD COUNTY HIGHWAY CONSTRUCTION AND ENGINEERING DEPARTMENT.

GENERAL NOTES-BROWARD COUNTY TRAFFIC ENGINEERING DEPT.

ALL PARTIES NOTE THE FOLLOWING:

- DIRECTIONAL BORES, UTILITY CONNECTIONS, THE PLACEMENT OF MOT AND ADVANCE SIGNAGE MAY BY THEIR PLACEMENT, DAMAGE/DESTROY THE COMMUNICATIONS CABLE/CONDUIT LOCATED INSIDE AND OUTSIDE THE PROJECT AREA. ADDITIONALLY, CURB/GUTTER/SIDEWALK REMOVAL/PLACEMENT, RELOCATION OF TREES, LANDSCAPING ACTIVITIES AND IRRIGATION ACTIVITIES ARE POTENTIAL CAUSES FOR DAMAGE TO BCTED'S COMMUNICATION CABLE/CONDUIT. ALL PARTIES SHALL EXERCISE EXTREME CAUTION WHEN WORKING IN PROXIMITY TO THE COMMUNICATIONS CABLE/CONDUIT.
- ANY ABOVE PROJECT ACTIVITY, INCIDENTAL OR OTHERWISE, WHICH IMPACTS OR DAMAGES THE COMMUNICATIONS CABLE/CONDUIT, SHALL BE SUBJECT TO THE FOLLOWING NOTES AND CONDITIONS BELOW:

COMMUNICATION NOTES:

- THE AGENCY RESPONSIBLE FOR MAINTENANCE OF THE TRAFFIC SIGNALS AND RELATED EQUIPMENT IS BROWARD COUNTY TRAFFIC ENGINEERING DIVISION (BCTED). ALL SYSTEM COMMUNICATIONS EQUIPMENT, CABLING AND RELATED MATERIAL SHALL COMPLY WITH BROWARD COUNTY'S LATEST EDITION OF MINIMUM STANDARDS AS EXPRESSED IN THE "STANDARDS AND SPECIFICATIONS – COMMUNICATION INFRASTRUCTURE" DOCUMENT. BROWARD COUNTY TRAFFIC ENGINEERING DIVISION WILL NOT ACCEPT ANY PROJECTS THAT DO NOT MEET THESE STANDARDS AND SPECIFICATIONS. FOR A COPY OF THESE STANDARDS REFER TO BROWARD COUNTY WEB SITE AT WWW.BROWARD.ORG/TRAFFIC OR CONTACT ROBERT BLOUNT, COMMUNICATIONS MANAGER AT RBLOUNT@BROWARD.ORG.
- THE CONTRACTOR SHALL MAINTAIN ONLINE COMMUNICATIONS OF EXISTING OR TEMPORARY SIGNALIZATION VIA INTERCONNECT COMMUNICATIONS CABLE OR TELCO PHONE LINES DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE TEMPORARY LINES AND CONNECTIONS AS NECESSARY. A TIME-BASED-COORDINATION (TBC) SYSTEM IS TO BE UTILIZED ONLY IF PROVISION OF THE TEMPORARY LINES IS NOT FEASIBLE. THE DEVELOPMENT AND IMPLEMENTATION OF THE TBC PROGRAM IS TO BE PERFORMED BY THE CONTRACTOR WITH OVERSIGHT BY A TRAFFIC ENGINEER REGISTERED IN THE STATE OF FLORIDA. COST OF MAINTAINING COMMUNICATIONS WITH THE CENTRAL SITE, INCLUDING TEMPORARY LINES AND CONNECTIONS, SHALL BE PAID FOR UNDER THE MAINTENANCE OF TRAFFIC. ALL REPORTED MALFUNCTIONS OF THE COMMUNICATIONS SYSTEM SHALL BE RESPONDED TO BY THE CONTRACTOR WITHIN TWO HOURS AND SHALL BE REPAIRED WITHIN TWENTY FOUR HOURS.
- THE CONTRACTOR SHALL BE AWARE THAT BELLSOUTH TELEPHONE DROPS AND SYSTEM COMMUNICATIONS INTERCONNECT MAY EXTEND THROUGHOUT THE PROJECT. CABLE RUNS AND/OR CONDUIT, TELEPHONE INTERFACE EQUIPMENT, PULL/JUNCTION BOXES AND ANY OTHER SIGNAL OR OTHER SYSTEMS EQUIPMENT DAMAGED BY THE CONTRACTOR SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. DAMAGED COMMUNICATIONS CABLE SHALL BE REPLACED AS AN ENTIRE RUN, FROM JUNCTION POINT TO JUNCTION POINT AND SHALL BE TERMINATED IN JUNCTION BOXES. THE CONTRACTOR SHALL OBTAIN SYSTEMS COMMUNICATIONS INFORMATION FROM THE APPLICABLE MAINTAINING AGENCY.
- ANY MATERIAL FURNISHED FOR THE PURPOSES OF: NEW INSTALLATION, REPLACEMENT OR REPAIR OF THE EXISTING COMMUNICATIONS INFRASTRUCTURE SHALL MEET THE STANDARDS AND SPECIFICATIONS OF BCTED; ANY SUPPLIED CONTROLLER CABINET, CONTROLLER, TELEMETRY UNIT, COMMUNICATIONS CABLE, PULL BOX, CONDUIT, TERMINATION DEVICE, JUNCTION BOX AND COMMUNICATIONS INTERFACE PANEL SHALL COMPLY WITH THE LATEST REQUIREMENTS AS STATED BY BCTED AND SHALL PROVIDE FOR FULL FUNCTIONALITY WITH THE EXISTING BCTED'S UTCS OPERATION.
- INCLUDE BROWARD COUNTY TRAFFIC ENGINEERING (BCTED) IN ANY NOTICE OF UTILITY OWNERSHIP OR WITHIN A "UTILITY OWNERS/CONTACT PERSON" TABLE AS: BROWARD COUNTY TRAFFIC ENGINEERING 954-484-9600 (BOB BLOUNT)
- ALL BCTED COMMUNICATIONS CABLE/CONDUIT SHALL BE LOCATED IN A MINIMUM OF 48 HOURS IN ADVANCE.

DRAINAGE NOTES

- DRAINAGE PIPE SHALL BE HIGH DENSITY POLYETHYLENE (HDPE) OR REINFORCED CONCRETE (RCP), THE USE OF RCP PIPE FOR PUBLIC ROADWAY CROSSINGS IS PREFERRED.
- CATCH BASINS, INLETS AND JUNCTION BOXES SHALL NOT BE INSTALLED IN DRIVEWAYS.
- PRIOR TO BACKFILLING EXFILTRATION TRENCHES, DRAINAGE INLETS OR MANHOLES, THE CONTRACTOR SHALL NOTIFY THE ENGINEERING INSPECTOR FOR AN INSPECTION.
- DRAINAGE STRUCTURES SHALL BE CLEANED PRIOR TO ACCEPTANCE BY CITY OR DEPARTMENT OF ENVIRONMENTAL PROTECTION (DPEP).
- ALL PIPES SHALL BE LAID IN DRY TRENCH. ALL MUCK OR UNSUITABLE MATERIALS IN TRENCHES, INLETS OR MANHOLES SHALL BE REMOVED AND BACKFILLED WITH SELECTED MATERIAL APPROVED BY THE ENGINEER.
- MINIMUM COVER FOR HDPE PIPE UNDER ASPHALT SHALL BE 24" COMPACTED LIMEROCK BASE. MINIMUM COVER FOR PIPE UNDER GRASS SHALL BE 18" COMPACTED SUBGRADE.
- THE CONTRACTOR SHALL MAINTAIN EXISTING DRAINAGE PATTERNS AND PREVENT ADVERSE FLOODING OF THE TRAVEL LANES DURING CONSTRUCTION.
- MAINTENANCE ACCESS SHALL BE PROVIDED ON BOTH SIDES OF EXFILTRATION TRENCHES IN THE FORM OF MANHOLES OR CATCH BASINS. THE MAXIMUM DISTANCE BETWEEN STORM STRUCTURES SHALL NOT EXCEED TREE THREEDUND (300) FEET).
- ALL EXFILTRATION SYSTEMS SHALL BE DESIGNED IN ACCORDANCE WITH SOUTH FLORIDA WATER MANAGEMENT DISTRICT'S (SFWMD) PERMIT INFORMATION MANUAL "MANAGEMENT AND STORAGE OF SURFACE WATER", LATEST EDITION.
- GEOTEXTILIE MATERIALS USED IN THE CONSTRUCTION OF EXFILTRATION TRENCHES SHALL BE IN ACCORDANCE WITH THE CRITERIA OF FDOT "ROADWAY AND TRAFFIC DESIGN STANDARDS" LATEST EDITION AND CITY OF FORT LAUDERDALE'S SPECIFICATIONS.

BROWARD COUNTY TRAFFIC ENGINEERING DIVISION
PROCEDURE FOR NOTIFICATION OF COMMUNICATION
DISRUPTION:

WHEN COMMUNICATIONS TO AN INTERSECTION MUST BE DISRUPTED BY A CONTRACTOR TO PERFORM WORK, THE CONTRACTOR SHALL PROVIDE AN ADVANCE TWO DAY NOTICE IN WRITING TO THE BROWARD COUNTY TRAFFIC ENGINEERING DIVISION. THIS NOTIFICATION SHALL BE CONVEYED VIA ELECTRONIC MAIL (EMAIL) TO THE COMMUNICATION'S MANAGER AT RBLOUNT@BROWARD.ORG. NOTIFICATION SHALL INCLUDE CONTACT PERSON, TELEPHONE NUMBER, PURPOSE, LOCATION AND DURATION. THE DISRUPTION SHALL LAST FOR NO MORE THAN 3 CONSECUTIVE BUSINESS DAYS. WHERE POSSIBLE, THE DISRUPTION SHALL BE AT OFF PEAK HOURS BEGINNING AT 9:00AM AND ENDING AT 3:00PM.

MAINTENANCE OF TRAFFIC SCHOOL/PEDESTRIAN

- THE "MAINTENANCE OF TRAFFIC" PLAN, PROVIDED BY THE CONTRACTOR, SHALL INCLUDE PROVISIONS FOR PEDESTRIAN AND/OR SCHOOL STUDENT TRAFFIC AS WELL AS VEHICULAR TRAFFIC. THE FOLLOWING ARE MINIMUM REQUIREMENTS.
- THE SAFE WALK ROUTE FOR ALL SCHOOL STUDENTS WITHIN THE VICINITY OF THE CONSTRUCTION ZONE SHALL BE MAINTAINED DURING THE TIMES STUDENTS ARE ARRIVING AT OR LEAVING SCHOOL. IF THE CURRENT WALKING SURFACE CAN NOT B MAINTAINED, THEN A TEMPORARY ROAD-ROCK 4' WALK WAY SHALL BE CREATED. THE SAFE WALK ROUTE SHALL BE SEPARATED FROM THE CONSTRUCTION ACTIVITY BY THE 4' HIGH ORANGE CONSTRUCTION FENCE FOR THE ENTIRE LENGTH OF THE PROJECT OR THE LENGTH OF THE WALK ROUTE, WHICHEVER IS LESS.
- ALL CONSTRUCTION EQUIPMENT AROUND ANY DESIGNATED CROSSWALK SHALL CEASE TO OPERATE DURING THE TIMES STUDENTS ARE ARRIVING AT OR LEAVING SCHOOL. ALL CONSTRUCTION EQUIPMENT ADJACENT TO A DESIGNATED WALK ROUTE SHALL CEASE OPERATING UNLESS SATISFACTORILY BARRICADED FROM THE WALK ROUTE.
- IN THE CASE THAT A DESIGNATED CROSSING OR ANY PORTION OF THE DESIGNATED WALK ROUTE CAN NOT BE MAINTAINED, THEN THE CONTRACTOR SHALL NOTIFY THE SPECIAL PROJECTS COORDINATOR AT BROWARD COUNTY TRAFFIC ENGINEERING DIVISION, (954) 847-2671, A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO CLOSING THAT ROUTE IN ORDER THAT AN ALTERNATE CROSSING/ROUTE CAN BE ESTABLISHED.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL ANY NECESSARY PAVEMENT, ROAD ROCK, PAVEMENT MARKING AND SIGNAGE AND/OR ANY PEDESTRIAN SIGNALIZATION AND/OR MODIFICATION TO ACCOMMODATE AN EXISTING OR ALTERNATE WALK ROUTE.
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE STATE CERTIFIED SCHOOL CROSSING GUARDS OR OFF DUTY POLICE OFFICERS TO CROSS STUDENTS AT ANY LOCATIONS OTHER THAN THOSE PREVIOUSLY DESIGNATED. THE CONTRACTOR MAY USE FLAG MEN, ONLY IF THEY ARE STATE CERTIFIED AS A SCHOOL CROSSING GUARD.
- THIRTY (30) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE SPECIAL PROJECTS COORDINATOR AT BROWARD COUNTY TRAFFIC ENGINEERING DIVISION, (954) 847-2671, TO ARRANGE A PRE-CONSTRUCTION – SCHOOL SAFETY MEETING.
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE BROWARD COUNTY SCHOOL BOARD PUPIL TRANSPORTATION DEPARTMENT, (754) 321-4440, TO ARRANGE A PRE-CONSTRUCTION – SCHOOL BUS ROUTE MEETING. THIS MEETING IS TO DETERMINE ALL BUS ROUTES AND TO MAKE ANY NECESSARY ARRANGEMENTS FOR REROUTING. THIS MEETING SHALL INCLUDE THE SPECIAL PROJECTS COORDINATOR FROM BROWARD COUNTY TRAFFIC ENGINEERING DIVISION, (954) 847-2671.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A SAFE AND ADEQUATE WALKING SURFACE FOR ALL SCHOOL CHILDREN/PEDESTRIANS. THE SAFE WALK ROUTE SHALL BE PART OF THE MAINTENANCE OF TRAFFIC PLAN.
- ALL VEHICLE DETECTION DEVICES SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT. ANY DEVIATION SHALL REQUIRE PRIOR WRITTEN APPROVAL BY THE TRAFFIC ENGINEERING DIVISION. ALL TRAFFIC ENGINEERING COMMUNICATIONS FACILITIES LOCATED WITHIN THE PROJECT LIMITS SHALL BE MAINTAINED THROUGHOUT THE PROJECT.
- ALL TRAFFIC CONTROL DEVICES USED WITHIN PUBLIC RIGHT OF WAY SHALL BE ON FDOT QUALIFIED PRODUCT LIST.

LEGEND:

SYMBOL	DESCRIPTION
	WATER METER BOX
	EXISTING VALVE
	PROPOSED VALVE
	FIRE HYDRANT
	BENCH MARK
	TREE
	NAIL IN BOTTLE CAP
	NAIL IN ASPHALT
	EXISTING GAS LINE
	EXISTING WATER MAIN
	EXISTING BURIED TELEPHONE
	EXISTING TELEPHONE
	EXISTING UNDERGROUND ELECTRIC
	EXISTING FORCE MAIN
	EXISTING OVERHEAD WIRES
	EXISTING CABLE TELEVISION
	EXISTING CHAIN LINK FENCE
	EXISTING WOOD FENCE
	EXISTING ELEVATION
	SOIL BORING LOCATION MARK
	SOIL TYPE SEPARATION MARK
	PROPOSED FORCE MAIN
	PUMP STATION
	MANHOLE NUMBER
	CONFLICT MANHOLE NUMBER
	PROPOSED SANITARY SEWER
	SAN. SEWER LATERAL (DOUBLE)
	SAN. SEWER LATERAL (SINGLE)

NOTE: THIS LEGEND IS INTENDED FOR MOST SANITARY SEWER AND STORM SEWER PROJECTS, HOWEVER, THERE ARE PROJECTS USING ADDITIONAL SYMBOLS. THESE SYMBOLS WILL BE LOCATED ON OTHER SHEETS.

NOTES

FLA. P.E. NO. 51915 STAN EDWARDS
--

DATE: JULY 2016	SCALE: N.T.S.
DRAWN BY: ENG	DESIGNED BY: SCALE: N.T.S.
CHECKED BY: N.T.S.	FIELD BOOK:

CITY OF FORT LAUDERDALE PUBLIC WORKS DEPARTMENT ENGINEERING & ARCHITECTURE 100 North Andrews Avenue, Fort Lauderdale, Florida 33301
--

REVISIONS				
NO.	DATE	BY	CHK'D	DESCRIPTION
1	3-11	RC.	J.P.	REV #22, DRNG. NOTES

PROJECT # 11880 PUMP STATION REHAB SANITARY SEWER PUMP STATION A-12 NOTES AND LEGEND 900 AVOCADO ISLE

SHEET NO. C-1	OF 15
TOTAL:	31
CAD FILE:	11880-C01-NOTE
DRAWING FILE NO.	4-1331-1424

PLOT DATE: 7/8/2016

GENERAL DEMOLITION NOTES:

1. THE LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES SHOWN ON THIS PLAN HAVE BEEN DETERMINED FROM THE BEST INFORMATION AVAILABLE AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THEIR ACCURACY. PRIOR TO THE START OF ANY DEMOLITION ACTIVITY, THE CONTRACTOR SHALL VERIFY THE LOCATION, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND OTHER FEATURES AFFECTING THE WORK PRIOR TO DEMOLITION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES WHICH MAY EFFECT THE DEMOLITION WORK.
2. CHAPTER 553.851 OF THE FLORIDA STATUTES REQUIRES THAT AN EXCAVATOR NOTIFY ALL UTILITIES A MINIMUM OF TWO (2) WORKING DAYS PRIOR TO EXCAVATING.
3. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, SUPERVISION, AND EQUIPMENT REQUIRED FOR THE ORDERLY DEMOLITION AND REMOVAL OF EXISTING STRUCTURES, PAVEMENT AND UTILITIES AS SHOWN ON THE DRAWINGS AND DESCRIBED HEREIN.
4. THE CONTRACTOR IS REQUIRED TO FAMILIARIZE HIMSELF WITH THE STRUCTURES TO BE DEMOLISHED.
5. THE FOLLOWING LIST OF STRUCTURES REQUIRING DEMOLITION IS INCLUDED FOR THE CONTRACTOR'S CONVENIENCE ONLY. THE DRAWINGS INDICATE THE SCOPE OF DEMOLITION WHERE DEMOLITION IS REQUIRED.
 - 5.1. DEMOLITION AND REMOVAL OF A 5' MIN.± STRIP OF EXISTING ON-SITE ASPHALT, CONCRETE AND CURBING AROUND THE PERIMETER OF THE EXISTING STRUCTURES AND UTILITIES BEING DEMOLISHED.
 - 5.2. REMOVAL OF EXISTING ON-SITE ABOVEGROUND AND UNDERGROUND UTILITIES, INCLUDING REMOVAL OR PLUGGING OF EXISTING UTILITIES AS SHOWN ON PLANS.
6. PRIOR TO REMOVAL OF ANY UNDERGROUND TANK AND OTHER COMPONENT, CONTRACTOR MUST COMPLETELY DRAIN THE SYSTEMS TO AN APPROVED SANITATION TANK FOR DISPOSAL TO AN APPROVED LOCATION, AS REQUIRED BY DISPOSAL PERMIT.
7. PROTECT AND SAVE ALL UTILITIES, UNLESS OTHERWISE NOTED.
8. ALL THE CONCRETE AND PAVEMENT TO BE REMOVED MUST BE SAW CUT CLEAN PRIOR TO REMOVAL
9. WET DOWN MASONRY WALLS AND DEBRIS DURING DEMOLITION AND LOADING OPERATIONS TO PREVENT THE SPREAD OF DUST (AS APPLICABLE TO PROJECT).
10. ALL EXISTING STRUCTURES, PAVEMENTS, SLABS, FOUNDATIONS, STEPS AND OTHER ON-SITE EXISTING FEATURES INDICATED ON THE DRAWINGS TO BE REMOVED SHALL BE DEMOLISHED AND REMOVED BY THE CONTRACTOR (AS APPLICABLE TO PROJECT).
11. ALL EXISTING SEWERS, PIPING AND UTILITIES SHOWN ARE NOT TO BE INTERPRETED AT THE EXACT LOCATION, OR AS THE ONLY OBSTACLES THAT MAY OCCUR ON THE SITE. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND PROCEED WITH CAUTION AROUND ANY ANTICIPATED FEATURES. GIVE NOTICE TO ALL UTILITY COMPANIES REGARDING DESTRUCTION AND REMOVAL OF ALL SERVICE LINES AND CAP ALL LINES BEFORE PROCEEDING WITH THE WORK.
12. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO REMOVAL OR RELOCATION OF ANY ELECTRICAL, TELEPHONE, CABLE AND/OR GAS LINES. SUFFICIENT TIME SHALL BE PROVIDED FOR RELOCATION AND CLOSE COORDINATION WITH THE UTILITY COMPANY TO PROVIDE A SMOOTH TRANSITION IN UTILITY SERVICE.
13. CONTRACTOR MUST STOP OPERATION AND NOTIFY THE OWNER/ENGINEER FOR PROPER DIRECTION IF ANY ENVIRONMENTAL OR HEALTH RELATED CONTAMINANT IS ENCOUNTERED DURING THE DEMOLITION/EXCAVATION PROCESS.
14. FILL FOR LOWER LEVELS OF DEMOLISHED STRUCTURES MAY INCLUDE CONCRETE OR MASONRY RUBBLE RESULTING FROM DEMOLITION, SUBJECT TO THE ENGINEER'S/ARCHITECT'S APPROVAL. RUBBLE SHALL NOT EXCEED SIX (6) INCHES IN LONGEST DIMENSION.
15. REMOVE AND LEGALLY DISPOSE OF ALL OTHER RUBBISH, RUBBLE, AND DEBRIS. COMPLY WITH ALL APPLICABLE LAWS AND REGULATIONS GOVERNING DISPOSAL OF WASTES AND DEBRIS.
16. CONTINUOUS ACCESS AND OPERATION SHALL BE MAINTAINED FOR THE SURROUNDING PROPERTIES AND BUILDINGS AT ALL TIMES.
17. PRIOR TO DEMOLITION OCCURRING ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED.
18. ALL SIGNS OUTSIDE THE DEMOLITION AREA ARE TO REMAIN UNLESS OTHERWISE SPECIFIED.
19. ANY MUCK ENCOUNTERED UNDER PROPOSED STRUCTURES SHALL BE REMOVED TO 5 FT. BEYOND THE FOOTPRINT OF THAT STRUCTURE. BACKFILL WITH APPROVED FILL MATERIAL SATISFYING ALL COMPACTION REQUIREMENTS.
20. ALL EXISTING UTILITIES WITHIN THE DEMOLITION SITE AREA SHALL BE ADJUSTED, REMOVED OR RELOCATED AT THE CONTRACTOR'S EXPENSE. ACTUAL WORK SHALL BE COORDINATED BY THE CONTRACTOR DIRECTLY W/ THE APPROPRIATE UTILITY COMPANY. ALL EXPENSES SHALL BE INCLUDED IN THE CONTRACTOR'S BID.
21. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES BEFORE EXCAVATION.
22. ALL TRASH, DEBRIS AND OTHER MATERIAL REMOVED FROM THE SITE SHALL BE PROPERLY DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

PRE-DEMOLITION RESPONSIBILITIES

1. UPON RECEIPT OF NOTICE OF AWARD, THE CONTRACTOR SHALL ARRANGE A PRE-DEMOLITION CONFERENCE TO INCLUDE ALL INVOLVED GOVERNMENTAL AGENCIES, ALL AFFECTED UTILITY OWNERS, THE OWNER, THE ENGINEER AND THE CONTRACTOR.
2. PRIOR TO DEMOLITION, THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT A DEMOLITION SCHEDULE DEPICTING EACH PHASE OF THE WORK.
3. PRIOR TO DEMOLITION, CONTRACTOR TO PROVIDE FOR THE OWNER A LISTING OF THE FACILITIES THE CONTRACTOR WILL UTILIZE FOR RECYCLING AND DISPOSAL OF SPECIFIC MATERIALS. CONTRACTOR TO SPECIFY THE MATERIALS INTENDED FOR RECYCLING AND THE MATERIALS INTENDED FOR DISPOSAL FOR OWNER'S APPROVAL.
4. PRIOR TO DEMOLITION CONTRACTOR TO PROVIDE THE OWNER SKETCHES SHOWING PROPOSED HAULING ROUTES TO RECYCLING AND DISPOSAL FACILITIES FOR APPROVAL.
5. PRIOR TO BEGINNING DEMOLITION, THE CONTRACTOR SHALL VERIFY THE SIZE, LOCATION, ELEVATION, AND MATERIAL OF ALL EXISTING UTILITIES WITHIN THE AREA OF DEMOLITION.
6. EXISTING UTILITY LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF EXISTING UTILITIES SHOWN OR FOR ANY EXISTING UTILITIES NOT SHOWN.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ANY EXISTING UTILITIES FOR WHICH IT FAILS TO REQUEST LOCATIONS FROM THE UTILITY OWNER. THE CONTRACTOR IS RESPONSIBLE AS WELL FOR DAMAGE TO ANY EXISTING UTILITIES WHICH ARE PROPERLY LOCATED.
8. THE LOCATIONS OF EXISTING UTILITIES AND STORM DRAINAGE SHOWN ON THE PLANS HAVE BEEN DETERMINED FROM THE BEST INFORMATION AVAILABLE AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. ENGINEER ASSUMES NO RESPONSIBILITY FOR INACCURACY. PRIOR TO THE START OF ANY DEMOLITION ACTIVITY, IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO MAKE ARRANGEMENTS FOR THE FIELD LOCATIONS AND FOR ANY RELOCATION'S OF THE VARIOUS EXISTING UTILITIES WITH THE UTILITY OWNERS, WHICH SHALL BE DONE IN A TIMELY MANNER TO MINIMIZE IMPACT ON DEMOLITION SCHEDULE. ANY DELAY CAUSED BY THE CONTRACTOR BY THE RELOCATION OF UTILITIES SHALL BE INCIDENTAL TO THE CONTRACT AND NO EXTRA COMPENSATION WILL BE ALLOWED.
9. SUNSHINE STATE ONE CALL OF FLORIDA, INC. REQUIRES THE CONTRACTOR TO CALL TWO (2) FULL BUSINESS DAYS (BUT NOT MORE THAN FIVE) PRIOR TO BREAKING GROUND TO FIND OUT WHERE BURIED FACILITIES (ELECTRICAL, GAS, TELEPHONE, CABLE, WATER) ARE LOCATED.

NOTES2

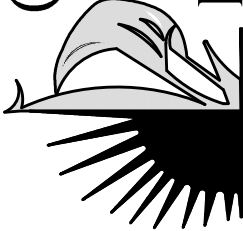
NOTES

BID SET

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
NOTES AND LEGEND
900 AVOCADO ISLE

SHEET NO.	OF
C-2	15
TOTAL:	31
CAD FILE:	
11880-C01-NOTE	
DRAWING FILE NO.	
4-1311424	

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D



CITY of FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE

100 North Andrews Avenue, Fort Lauderdale, Florida 33301




















DRAWN BY:	ENG	DATE:	JULY 2016
DESIGNED BY:	WW2011	SCALE:	N.T.S.
CHECKED BY:	WW2011		
		FIELD BOOK:	

FLA. P.E. NO.	51915
STAN EDWARDS	

LEGEND:

SYMBOL

DESCRIPTION

	WATER METER BOX
	EXISTING VALVE
	PROPOSED VALVE
	FIRE HYDRANT
	BENCH MARK
	TREE
NBC	NAIL IN BOTTLE CAP
NIA	NAIL IN ASPHALT
	GAS LINE
	WATER MAIN
	BURIED TELEPHONE
	TELEPHONE
	UNDERGROUND ELECTRIC
	FORCE MAIN
	OVERHEAD WIRES
	CABLE TELEVISION
	CHAIN LINK FENCE
	WOOD FENCE
	EXISTING ELEVATION
	SOIL BORING LOCATION MARK
	SOIL TYPE SEPERATION MARK

WATER SYSTEM NOTES:

PIPE D.I.P.

- Ductile Iron water main pipe shall conform to the requirements of A.N.S.I./ A.W.W.A. C-151/A 21.51-02 and lined and coated per A.N.S.I./A.W.W.A. C-104/A-214-03. 20" and smaller pipe shall be pressure class 350; 24" and larger, pipe shall be pressure class 250.
- All DIP shall have adequate protective measures against corrosion and it shall be used only if as determined by the design engineer, based on field conditions.
- All DIP shall be installed in accordance with A.N.S.I./A.W.W.A. C-600-99, or latest revision.

PIPE P.V.C.

- All P.V.C. mains shall be series 1120, class 150 (DR 18) pressure pipe, conforming to A.N.S.I./A.W.W.A. C-900-07', or latest revision, and shall have push on joints, and iron pipe O.D.
- All P.V.C. pipe shall be installed in accordance with the Uni-Bell plastic pipe Association's "Guide for installation of P.V.C. pressure pipe for Municipal water distribution system". Water distribution pipe shall be of "BLUE" color. All water main installations shall comply with the color coding requirements of Chapter 62-555.320(21)(b)3 F.A.C. (Florida Administrative Code).
- Detector tape on all P.V.C. mains shall be installed 18" above the water main.
- All P.V.C. mains must have #6 copper wire, single strand, placed on top of pipe, shall be electrically continuous over the entire length of the pipe, and fastened every 10' with a #12 wire.

FITTINGS

- Fittings shall be ductile iron meeting A.N.S.I./A.W.W.A. C153/21.00 and shall be coated with 6 to 8 mil. Thickness coal tar epoxy conforming to the requirements of A.N.S.I./A.W.W.A. C550-05 and C116/A21.03.
- Restrained joint pipe shall be used for all bends, tees, crosses, plugs, and fire hydrants. Thrust blocks shall not be allowed.
- Retainer glands/mechanical joint restraint shall be used only if authorized by the Engineer and shall conform to A.N.S.I./A.W.W.A. standards C 111/A-21.11-03, or latest revision.
- All glands shall be manufactured from ductile iron as listed by underwriter's laboratory for 250 P.S.I. minimum water pressure rating.
- Glands shall be CLOW Corporation model F-1058, standard fire protection equipment company, or approved equal.

VALVES

- Tapping valves shall be Mueller H667 or approved equal.
- Tapping sleeves shall be Mueller H615 or approved equal.
- Gate valves 3" or less shall be NIBCO T-133 OR T-136 with malleable hand wheels. No substitutions allowed.
- Gate valves 4" or larger shall meet A.W.W.A. C-500-02 specification (latest revision). Valves shall be Mueller Co. or approved equal.
- All valves shall be furnished with extension type cast iron valve boxes of proper length for pipe depth. All boxes shall conform with A.W.W.A. specifications with a shaft of no less than 5 inches and have the word "WATER" cast in the cover. Base of valve box shall have a flared section to fit over stuffing box of valve.

HYDRANTS

- Fire hydrants shall be breakaway Mueller Super Centurion 250, US Pipe Metropolitan 250, American Darling B-84B, Clow Medallion, or approved equal.
- Fire hydrants shall be installed with the center of the nozzle 18" above finished grade.
- Dead-end water mains 6" or larger shall terminate with a fire hydrant.

PLACEMENT

- All water mains shall be installed with a minimum cover of 36" for P.V.C and 30" for DIP except where shown differently on plans.
- A continuous and uniform bedding shall be provided. Backfill material shall be tamped in layers around the pipe as shown on the plans and/or City of Fort Lauderdale Construction Standards and Specifications, January 1982. Rocks or stones larger than 3/4" diameter found in the trench shall be removed for a depth of at least 6" below the bottom of the pipe.
- Pipe deflection shall not exceed 75% of the maximum deflection recommended by the manufacturer.

SEPARATION

- Sanitary sewers and force mains should cross under water mains whenever possible. Sanitary sewers and force mains crossing water mains shall be laid to provide a minimum vertical distance of 18" between the invert of the upper pipe and the crown of the lower pipe whenever possible.
- Where sanitary sewer force mains must cross a water main with less than 18" vertical separation, both the sewer and water main shall be constructed of ductile iron pipe (DIP) at the crossing. Sufficient lengths of DIP must be used to provide a minimum separation of 10 feet between any two joints. All joints on the water main within 20 feet of the crossing must be mechanically restrained. A minimum vertical clearance of 6" must be maintained at all crossings.
- A minimum 10 foot horizontal separation shall be maintained between any type of sewer and water main in parallel installations whenever possible.
- The preferred separation between water mains and sewer mains shall be 10 feet. In cases where it is not possible to maintain a 6 foot horizontal separation between the water mains and sewer mains, one of the following conditions must be met. The minimum separation between water and sewer mains shall be 3 feet:

SEPARATION (CONT'D)

- The water main must be laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer or force main at such elevation that the bottom of the water main is at least 18 inches above the top of the sewer.
- The sewer or force main is encased in concrete or a watertight carrier pipe.
- Both the sewer and the water main are constructed of pressure pipe tested to 150 p.s.i.
- Where it is not possible to maintain a vertical distance of 18" in parallel installations, the water main shall be constructed of DIP and the sanitary sewer or force main shall be constructed of DIP, with a minimum vertical clearance of 6". The water main should be above the sewer. Joints on the water main shall be located as far apart as possible from the joints on the sewer or force main (staggered joints).
- All crossings shall be arranged so that the sewer pipe joints and the water main pipe joints are equidistant from the point of crossing (pipes centered on the crossing).
- Where a new pipe conflicts with an existing pipe with less than 18" vertical clearance, the new pipe shall be arranged to meet the crossing requirements above.

TESTING, DISINFECTION

- Pipe shall be tested under constant pressure of 150 P.S.I. for a minimum test period of 2 hours and shall not exceed the leakage requirements as per A.N.S.I./A.W.W.A. specifications of C-600-05 leakage formula:
 $Q = (LD \sqrt{P}) / 148,000$
Q = QUANTITY OF MAKEUP WATER, (IN GALLONS PER HOUR)
L = LENGTH OF PIPE SECTION BEING TESTED, (IN FEET).
D = NOMINAL DIAMETER OF THE PIPE, (IN INCHES).
P = AVERAGE TEST PRESSURE DURING THE HYDROSTATIC TEST, (IN POUNDS PER SQUARE INCH GAUGE).
- The City of Fort Lauderdale Public Services Department will take all bacteriological tests, to be scheduled via inspector. If otherwise specified in contract detailed specification and/or authorized by the engineer of record, bacteriological tests may be performed by a certified environmental testing laboratory.
- Disinfection of mains shall comply with A.N.S.I./A.W.W.A. C-651-05 standard. Bacteriological sampling points shall be designated on the engineering plans. Minimum one sampling point at each end. Maximum space between sampling points is 1200 feet.

CONNECTION

- All connections to existing mains shall be made under the direction of the City of Fort Lauderdale.
- There shall be no connection to an existing water main until pressure and bacteriological tests have been conducted and the results are approved and accepted by the City of Fort Lauderdale.

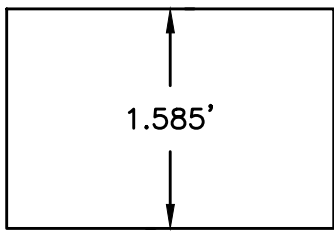
SERVICE CONNECTIONS

- All meter service connections shall be bronze from plug valve. No gate valves are to be used (2" or less).
- Service saddles shall be ductile iron with stainless steel straps. Saddles shall be double strap type. All service saddles shall conform to A.N.S.I./A.W.W.A. C 111/A-21.11-00 and A.S.T.M. A588.
- All service lines shall be copper tubing, type "K", or plasticized polyethylene 3408, A.S.T.M. D-2737, S.D.R. 9, 200 P.S.I.

NOTE:

ALL GRADES
BASED ON NGVD 1929

N.G.V.D. 29



N.A.V.D. 88

NOTES

BID SET

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
WATER NOTES
900 AVOCADO ISLE

SHEET NO.	OF
C-3	15
TOTAL:	31
CAD FILE:	11880-C03-NOTE
DRAWING FILE NO.	4-137-1424

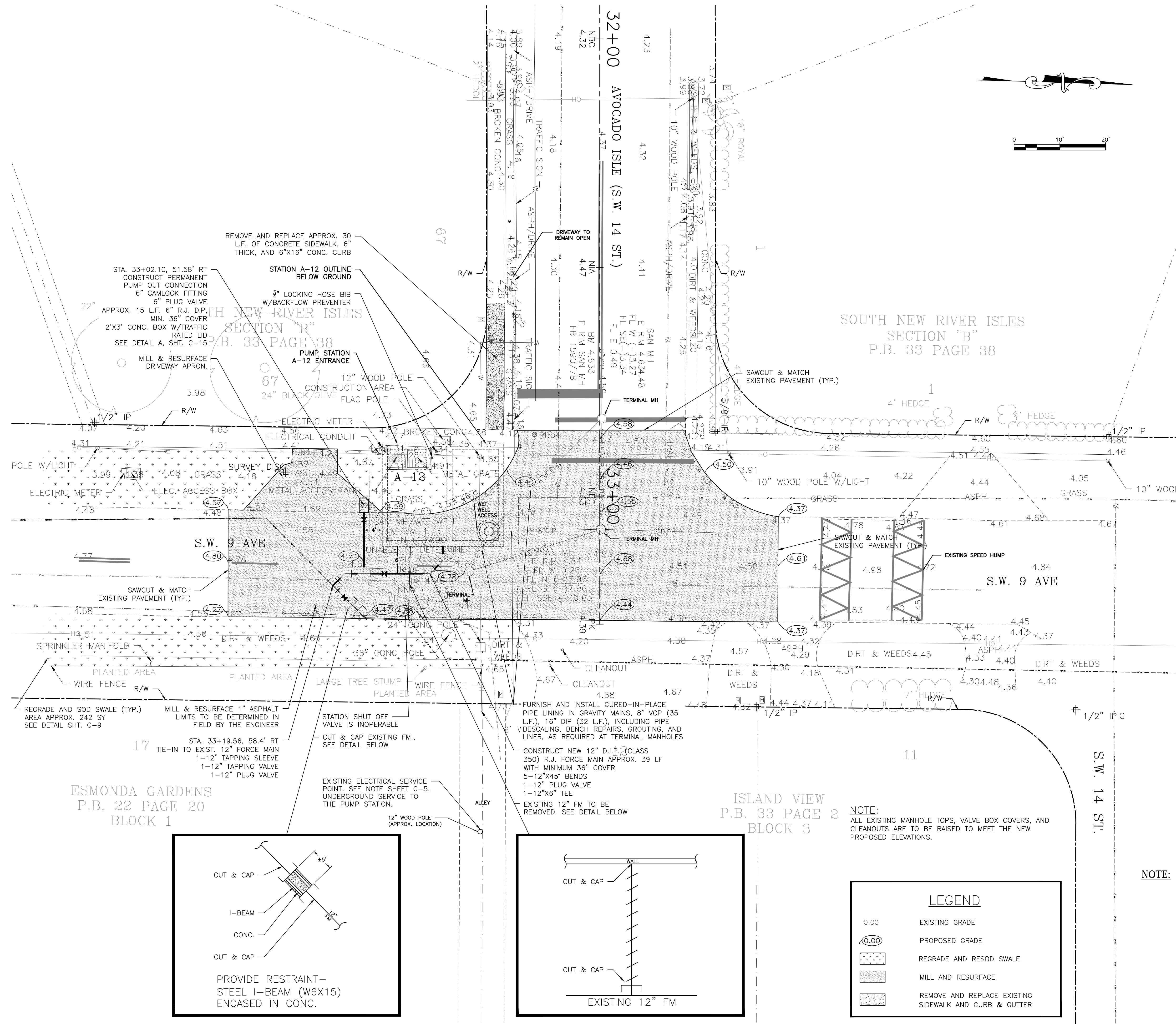
DRAWN BY:	ENG	DATE:	JULY 2016
DESIGNED BY:	SCALE:	N.T.S.	
CHECKED BY:	WW2011	WW2011	
FIELD BOOK:			

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D
1	04/06	R.C.	T.A.
2	08/08	R.C.	W.S.
3	02/09	R.C.	W.S.
4	05/10	R.C.	J.P.

7	04/15	W.D.	S.E.	DATUM CONVERSION
6	02/11	R.C.	J.P.	REVISE NOTE 5
5	10/10	R.C.	J.P.	REVISE NOTE 21, 31.

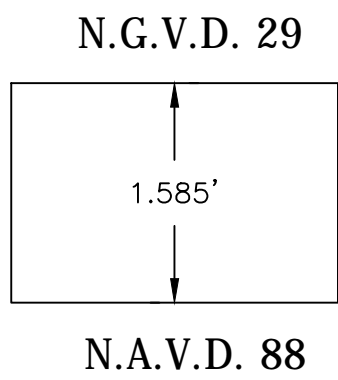
Thursday, July 14, 2016 11:37:04 AM



SEE NOTES SHEET C-5

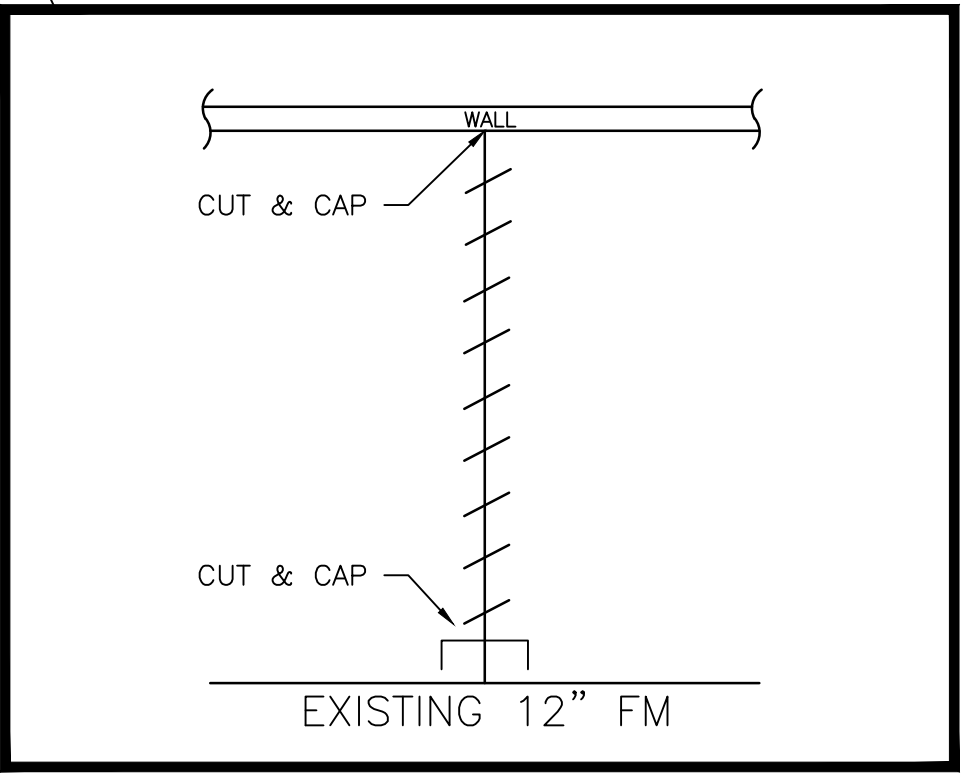
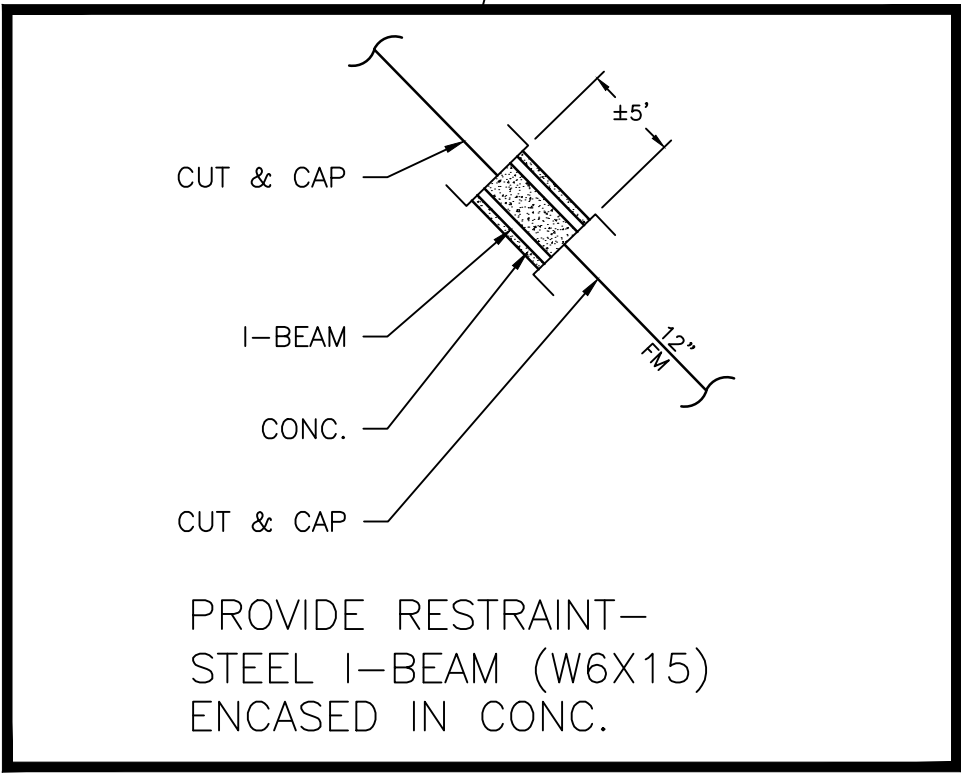
NOTE:
ALL EXISTING MANHOLE TOPS, VALVE BOX COVERS, AND
CLEANOUTS ARE TO BE RAISED TO MEET THE NEW
PROPOSED ELEVATIONS.

NOTE: ALL GRADES
BASED ON NGVD 1929



PLAN

LEGEND	
0.00	EXISTING GRADE
	PROPOSED GRADE
	REGRADE AND RESOD SWALE
	MILL AND RESURFACE
	REMOVE AND REPLACE EXISTING SIDEWALK AND CURB & GUTTER



BID SET

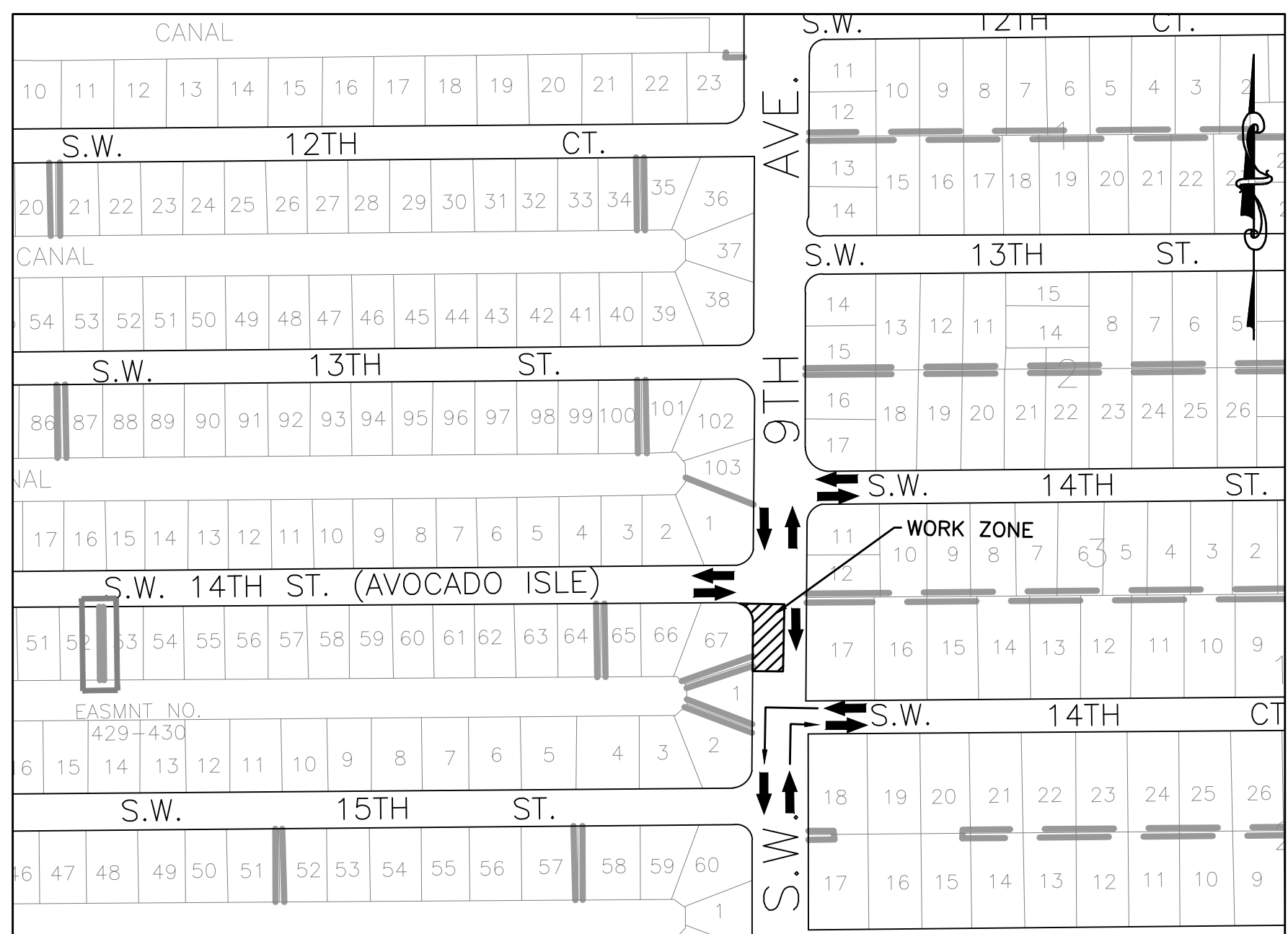
PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
PLAN
900 AVOCADO ISLE

SHEET NO.	OF
C-4	15
TOTAL:	31
CAD FILE:	11880-C04-MULTI
DRAWING FILE NO.	4-13-16-11880

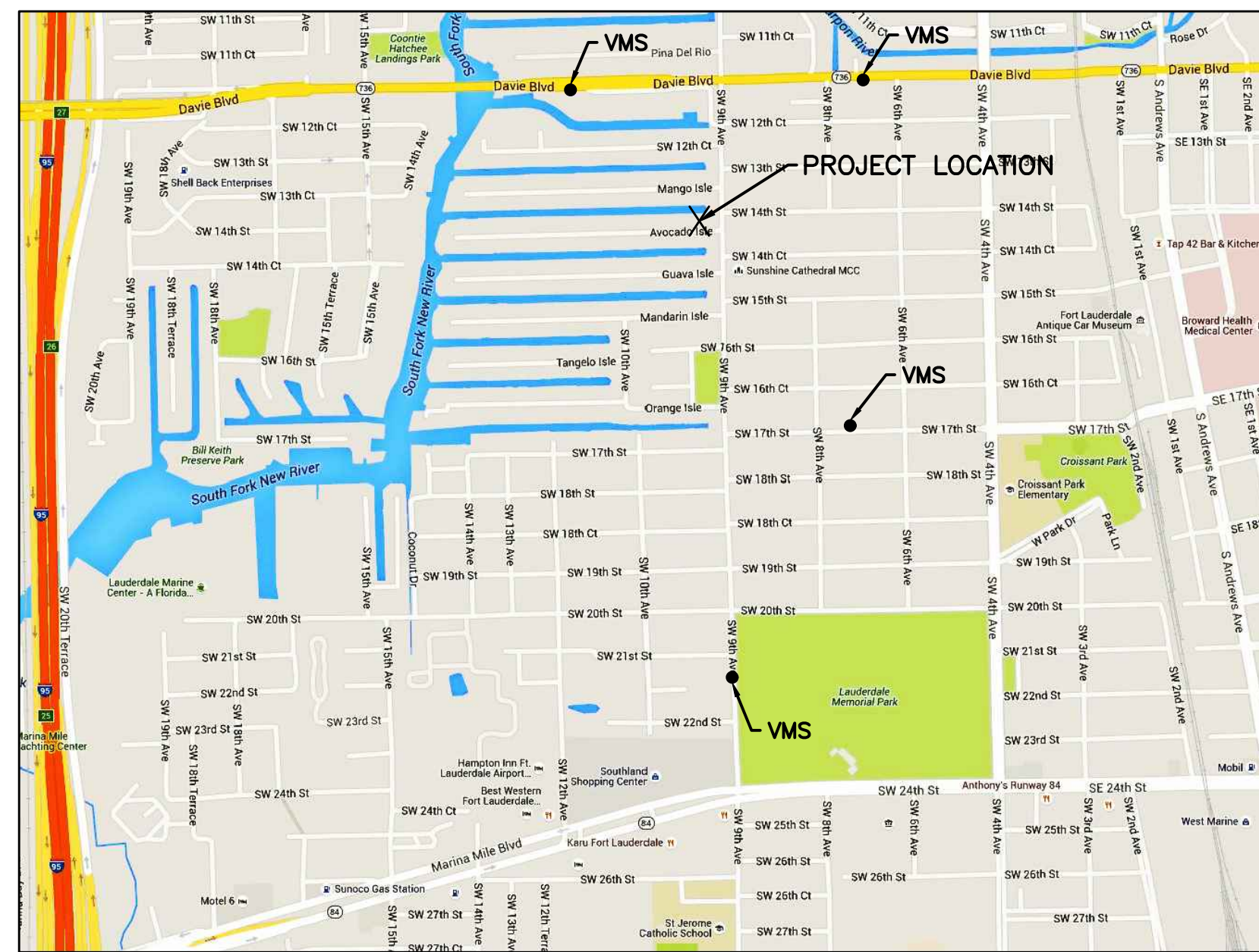
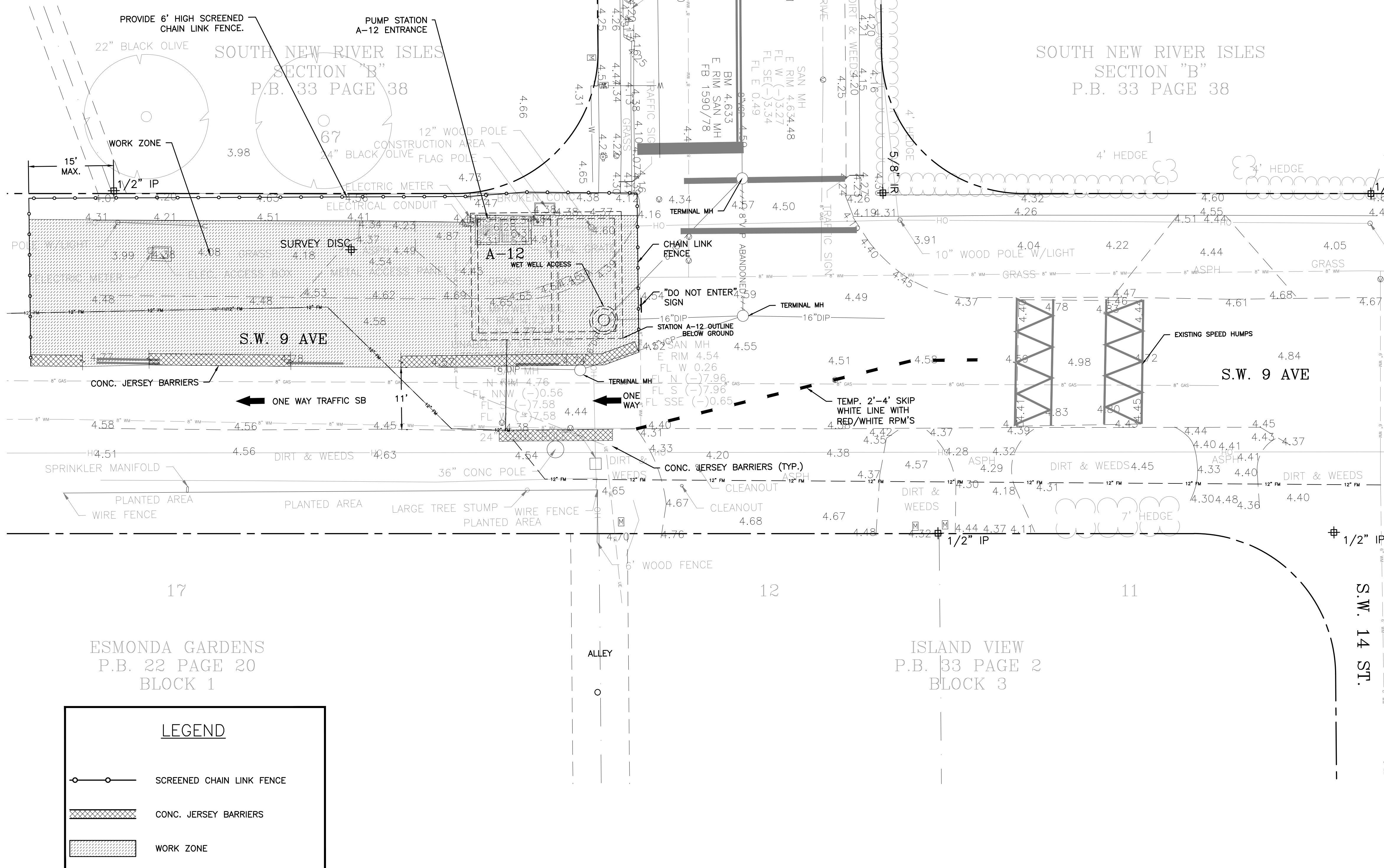
DRAWN BY:	CMB	DATE:	JULY 2016
DESIGNED BY:	LMO/SE	SCALE:	1"=10'-0"
CHECKED BY:	SE		
FIELD BOOK:			

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS					
NO.	DATE	BY	CHK'D	DESCRIPTION	
1	04/2015	W.D.	S.E.	DATUM	CONVERSION
2	02/2016	W.D.	S.E.	SHEET	REVISED



TRAFFIC CIRCULATION AT WORK SITE



LOCATIONS FOR VARIABLE MESSAGE SIGNS (VMS)

VARIABLE MESSAGE SIGNS (VMS)

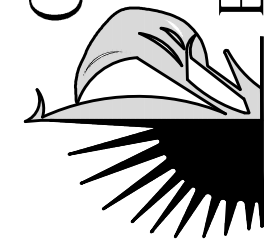
- INSTALL FOUR (4) VARIABLE MESSAGE SIGNS (VMS) AS SHOWN ON MAP.
- SIGNS SHALL BE ERECTED ONE (1) WEEK BEFORE START OF CONSTRUCTION TO GIVE ADVANCE NOTICE TO MOTORISTS AND RESIDENTIAL COMMUNITY.
- SIGNS SHALL OPERATE FOR THE ENTIRE DURATION OF THE PROJECT THAT SW 9 AVE IS PARTIALLY OR COMPLETELY CLOSED.
- SUBMIT VMS FLASHING MESSAGES FOR REVIEW.
- VMS ARE PART OF THE MOT PAY ITEM.
- THERE SHALL BE NO ADDITIONAL COMPENSATION FOR RELOCATING VMS TO OTHER STREETS DURING CONSTRUCTION, AS MAY BE ORDERED BY THE PROJECT MANAGER, BASED ON TRAFFIC NEEDS, OR COMMUNITY CONCERNS, ETC.

STAGING

- THE WORK ZONE SHALL ENCOMPASS THE WEST HALF OF ROADWAY BESIDE THE PUMP STATION, WHILE TRAFFIC IS MAINTAINED ON THE EAST SIDE OF ROADWAY.
- THE STAGING APPROACH IS A PARTIAL ROAD CLOSURE WHILE MAINTAINING ONE LANE OF TRAFFIC TO REDUCE THE IMPACT OF CONSTRUCTION ON LOCAL TRAFFIC.
- SECURE THE WORKSITE WITH FENCING, SILT SCREENS, AND JERSEY BARRIERS.
- COMPLETE ROAD CLOSURE MAY BE NECESSARY AT TIMES FOR CERTAIN ELEMENTS OF THE CONSTRUCTION. MINIMIZE THE DURATION OF COMPLETE ROAD CLOSURES, AND MODIFY VMS MESSAGES. NO ADDITIONAL COMPENSATION FOR COMPLETE CLOSURES OF SW 9 AVE.
- THE STAGING PLAN IS CONCEPTUAL. THERE SHALL BE NO ADDITIONAL COMPENSATION FOR ADJUSTMENTS TO THE LAYOUT BEFORE OR AFTER INSTALLATION FOR EFFICIENCY, SAFETY, AND EASE OF OPERATION, ETC., NOR FOR ADDITIONAL FENCING OR JERSEY BARRIERS THAN SHOWN ON THE PLAN.
- BYPASS PUMPING LINES TO BE BURIED TO ACCOMMODATE TRAFFIC.

STAGING

FLA. P.E. NO.

51915
STAN EDWARDSDATE: JULY 2016
DESIGNED BY: SE
CHECKED BY: SE
FIELD BOOK: 33301CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENTENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301REVISIONS
BY
DATE
NO.DESCRIPTION
DATE
W.D.CONVERSION
S.E.
NO.PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
STAGING
900 AVOCADO ISLE

SHEET NO.

OF

C-4A

15

TOTAL:

31

CAD FILE:

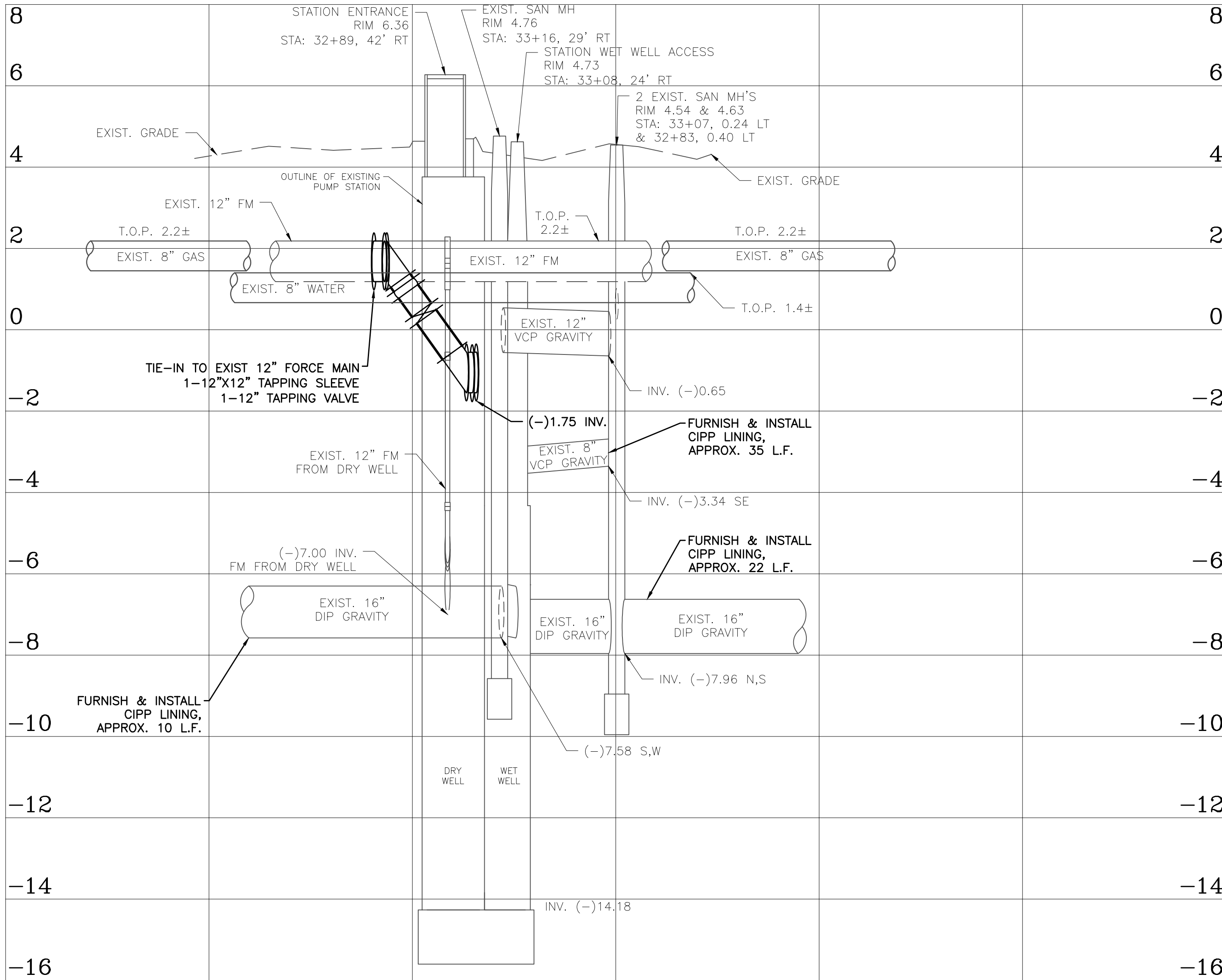
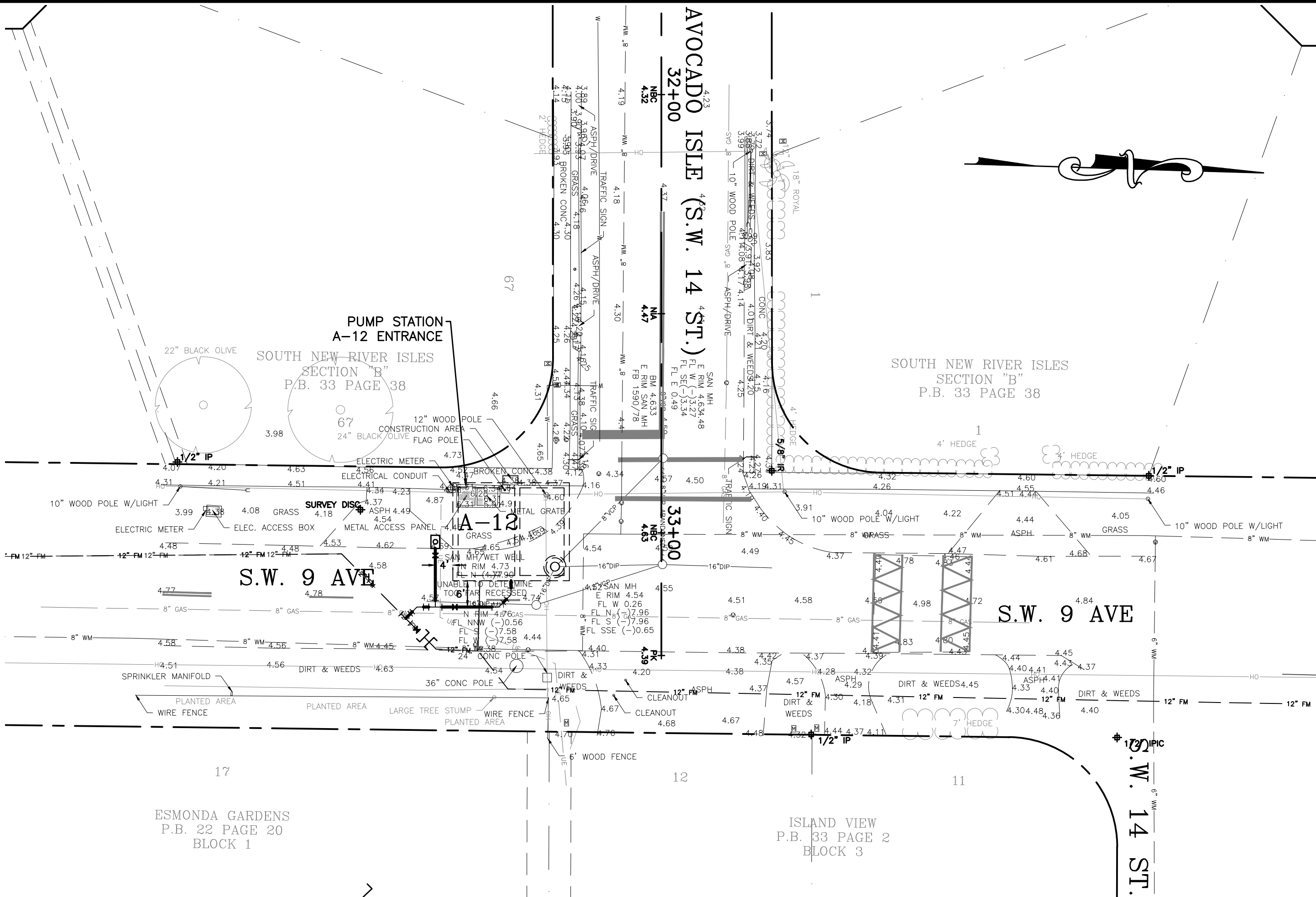
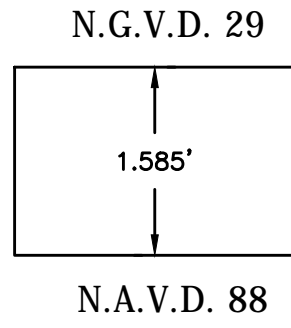
11880-C04A-STAGE

DRAWING FILE NO.

4-13-16

NOTE:

ALL GRADES
BASED ON NGVD 1929



NOTES:

1. MAINTAIN ACCESS TO AVOCADO ISLE AT ALL TIMES.
2. CONTACT IMMEDIATE RESIDENT BEFORE MOBILIZING TO THE SITE.

MOBILIZATION & DEMOBILIZATION

THERE SHALL BE NO SEPARATE PAYMENT FOR MOBILIZATION AND DEMOBILIZATION. CONTRACTOR SHALL INCLUDE FOR SUCH IN ALL THE SEPARATE PAY ITEMS FOR THE WORKS. MOBILIZATION AND DEMOBILIZATION INCLUDES BUT IS NOT LIMITED TO BONDS, VIDEOS, INSURANCE, SITE CLEANUP, SANITATION FACILITIES, LABOR ASSOCIATED WITH PERMIT ACQUISITION, CONTRACTOR'S STAGING AREA, PROJECT SIGNS, FLYERS, PROJECT FENCE, TESTING, PROJECT COORDINATION, ETC.

MOT

1. SEPARATE MOT SUBMITTALS REQUIRED FOR PARTIAL AND FULL ROAD CLOSURES.
2. PROVIDE COPY OF APPROVED MOT'S TO STEPHEN RAMOUTAR, TEL. (954) 847-2671, AT BROWARD CO. TRAFFIC ENG.

BYPASS PUMPING

1. CONTRACTOR TO PROVIDE BY-PASS SYSTEM DURING REHABILITATION OF PUMP STATION A-12. USE HOSPITAL QUIET EQUIPMENT.
2. SUBMIT BYPASS PLAN TO CITY FOR REVIEW.
3. TAKE ALL NECESSARY MEASURES TO REDUCE NOISE TO THE RESIDENTS.
4. THERE SHALL BE NO SEPARATE PAYMENT FOR BYPASS PUMPING. INCLUDE IN PUMP STATION LUMP SUM ITEM.
5. BYPASS PUMPING INCLUDES PERMANENT PUMP-OUT CONNECTION, AND TEMPORARY PUMP-OUT CONNECTION, IF SO REQUIRED TO ACCOMPLISH THE WORKS.

RESTRAINED JOINTS

ALL FITTINGS AND PIPE JOINTS FOR NEW 12" & 6" DIP FORCE MAIN SHALL BE RESTRAINED JOINT.

SIDEWALK

REMOVE AND REPLACE SIDEWALK AREAS THAT ARE DAMAGED BY CONTRACTOR'S OPERATIONS; NO ADDITIONAL PAYMENT.

ELECTRICAL SERVICE

1. ELECTRICAL SERVICE TO PUMP STATION RUNS UNDERGROUND. ELECTRICAL WORK INCLUDES REMOVAL OF ALL EXISTING CONDUIT AND POWER FEEDS FROM SERVICE POINT IN ALLEY ACROSS THE STREET.
2. COORDINATE WITH FPL FOR NEW ELECTRICAL SERVICE FOR THE PUMP STATION. SEE SHEET E-1.

PAVEMENT RESTORATION

RESTORATION OF PAVEMENT MARKINGS SHALL BE INCLUSIVE IN ASPHALT PAVING.

VENT

EXISTING WETWELL VENTILATION POLE SHALL REMAIN IN USE.

WATER SERVICE

COORDINATE WITH UTILITIES OPERATIONS FOR LOCATION OF OUTSIDE HOSE BIB/BACKFLOW PREVENTER.

STATION SHUT-OFF VALVE

CONTRACTOR IS ADVISED THAT STATION SHUT-OFF VALVE WAS FOUND TO BE INOPERABLE, AND MAY BE FROZEN IN THE "OPEN" POSITION. THE VALVE MIGHT BE UNUSABLE.

TEMPORARY VENTILATION SYSTEM

SUPPLY TEMPORARY VENTILATION SYSTEM DURING CONSTRUCTION.

SOLID WASTE DISPOSAL

1. COORDINATE WITH CITY OF FORT LAUDERDALE SANITATION SERVICES TO AVOID INTERRUPTION TO WASTE DISPOSAL SERVICES (RESIDENTIAL GARBAGE, BULK TRASH, RECYCLING, ETC.). CONTACT MELISSA DOYLE, PROGRAM MANAGER, TEL. (954) 828-6111.
2. PROVIDE FLAG MEN TO DIRECT GARBAGE COLLECTION TRUCKS ALONGSIDE THE WORK ZONE.

SCHOOL BUS ROUTE

SW 9 AVE IS A ROUTE FOR BROWARD CO. SCHOOL BUSES (10). THERE IS A BUS PICKUP AT THE PUMP STATION SITE. COORDINATE WITH RUTH MASTERS, ROUTE PLANNER, TEL. (754) 321-4400.

TESTING

CONTRACTOR SHALL RETAIN THE SERVICES OF AN INDEPENDENT, CERTIFIED, TESTING LAB TO PERFORM TESTING AS REQUIRED BY THE SPECIFICATIONS, CONTRACT DRAWINGS, AND ANY APPLICABLE PERMITTING AGENCY. TESTING INCLUDES, BUT IS NOT LIMITED TO, DENSITY TESTING, CONCRETE CYLINDER, AND SLUMP TESTS. SEE CONSTRUCTION AGREEMENT, PAGE C-22, SECTION 11.2, IN THE CONTRACT DOCUMENTS.

FLA. P.E. NO.

51915
STAN EDWARDS

DRAWN BY: CMB
DESIGNED BY: LMO/SE
CHECKED BY: SE

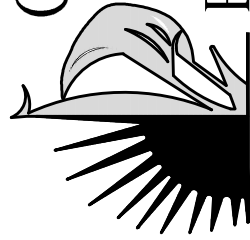
DATE: JULY 2016
SCALE: 1"=20'-0"
V: 1"=2'-0"

FIELD BOOK

CITY OF FORT LAUDERDALE

PUBLIC WORKS DEPARTMENT

ENGINEERING & ARCHITECTURE



100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO. 1
DATE 04/20/15
BY
CHK'D
DESCRIPTION
DATE
CONVERSION

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
PLAN AND PROFILE
900 AVOCADO ISLE

SHEET NO.

OF

C-5

15

TOTAL:

31

CAD FILE:

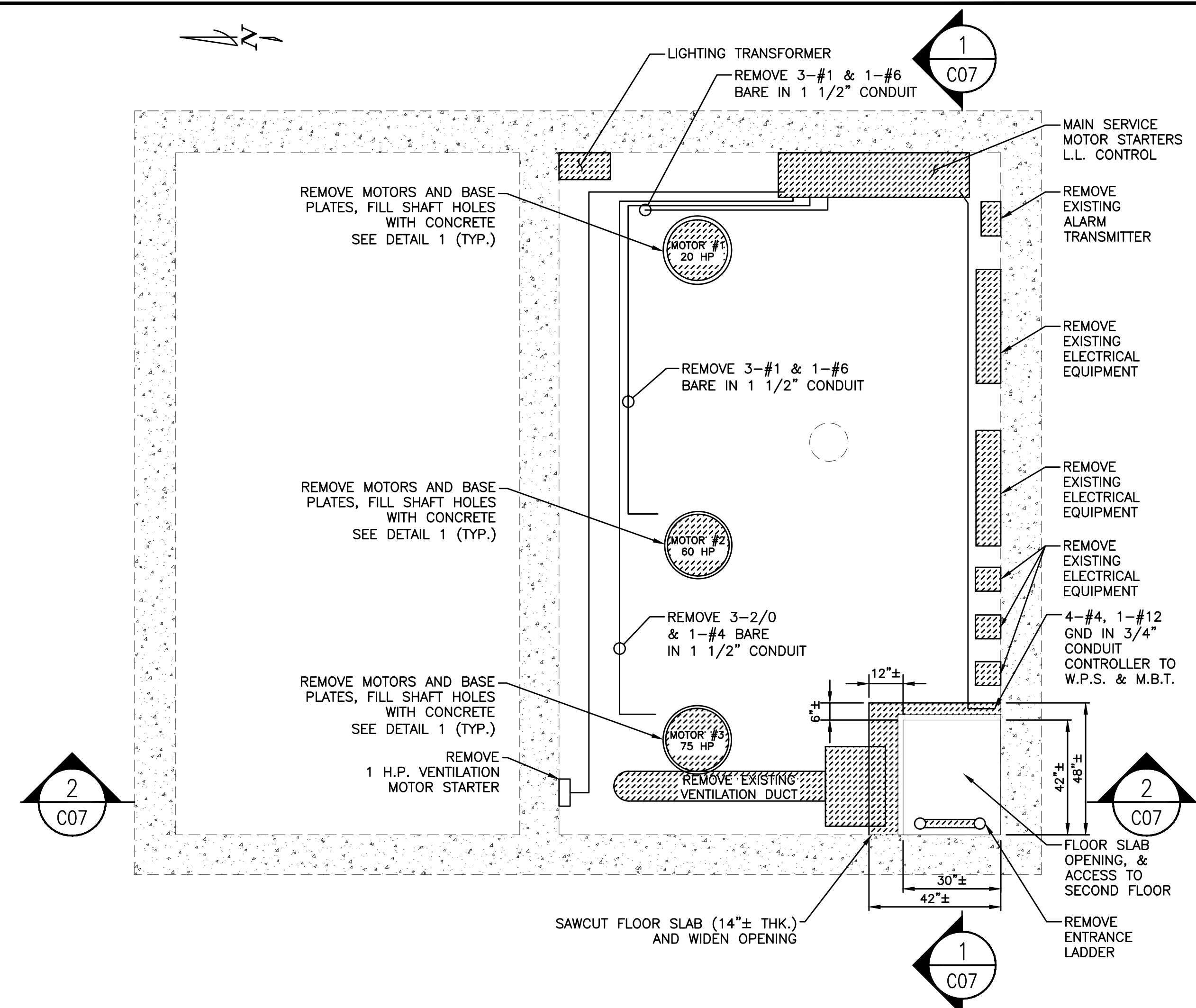
11880-C04-MULTI

DRAWING FILE NO.

4-1311-14

EXHIBIT 4

Page 634 of 663



TOP PLAN
3/8"=1'-0"



1. REMOVE AND DISPOSE OF ALL PUMPS, ALL PIPING, VALVES, FITTINGS, AND CONC. SUPPORT.
2. REMOVE AND DISPOSE OF HATCHES AS SHOWN
3. REMOVE AND DISPOSE ELECTRICAL EQUIPMENT AND WIRING AS SHOWN. SALVAGE AND RETURN CONTROL PANEL AND GENERATOR RECEPTACLE TO UTILITIES.
4. REMOVE AND DISPOSE OF VENTILATION DUCT WORK AS SHOWN
5. REMOVE AND DISPOSE OF ALL WATER SUPPLY PIPING, VALVES, FITTINGS, AND HOSE BIB.
6. PRESSURE CLEAN AND REMOVE ALL EXISTING PAINT FROM ALL INTERIOR AND EXTERIOR SURFACES, AND PREP. AND DRY OUT FOR REPAINTING.
7. PRESSURE CLEAN AND VACUUM THE WET PIT. INSPECT ALL SURFACES FOR CONCRETE AND STEEL DETERIORATION, AND PROVIDE REPORT TO THE ENGINEER. SEE SPEC. SECTION 03720
8. TESTING FOR ASBESTOS WAS NEGATIVE.
9. LEAD PAINT WAS IDENTIFIED AT EXTERIOR, PUMPS, PIPES. SEE REPORT IN APPENDIX TWO BY SGF ENVIRONMENTAL CONSULTANTS, INC., DATED 7/24/15, FOR LOCATIONS AND RECOMMENDATIONS FOR PROPER TREATMENT DURING DEMOLITION AND DISPOSAL.
10. THERE SHALL BE NO SEPARATE PAYMENT FOR TREATMENT OF LEAD-CONTAINING/LEAD-BASED PAINT. IT SHALL BE INCLUSIVE IN CONTRACTOR PRICING.
11. CONFIRM THE FLOOR SLAB OPENING DIMENSIONS REQUIRED FOR PASSING THE PUMPS & BASES WITH PUMP MANUFACTURER, BEFORE SAWCUTTING SLAB.

 DEMOLITION

DEMOLITION PLAN

SHEET NO.	OF
C-6	15
TOTAL:	31
CAD FILE: 11880-C06-MULTI	
DRAWING FILE NO. 4-137 T6-124	



PUMP STATION A-12


DEMOLITION SECTIONS

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
DEMOLITION SECTIONS
900 AVOCADO ISLE

SHEET NO.	OF
C-7	15
TOTAL:	31
CAD FILE:	
11880-C06-MULTI	
DRAWING FILE NO.	
4-13 AM 16-1-24	

[illegible]

DRAWN BY:	CMB	DATE:	JULY 2016
DESIGNED BY:	LMO	SCALE:	3/8"=1'-0"
CHECKED BY:	SE		
OFFICE BOOK:			



CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

FLA. P.E. NO.

51915
STAN EDWARDS

DRAWN BY:	DATE:
-----------	-------

DESIGNED BY:	CMB	JULY 2016
--------------	-----	-----------

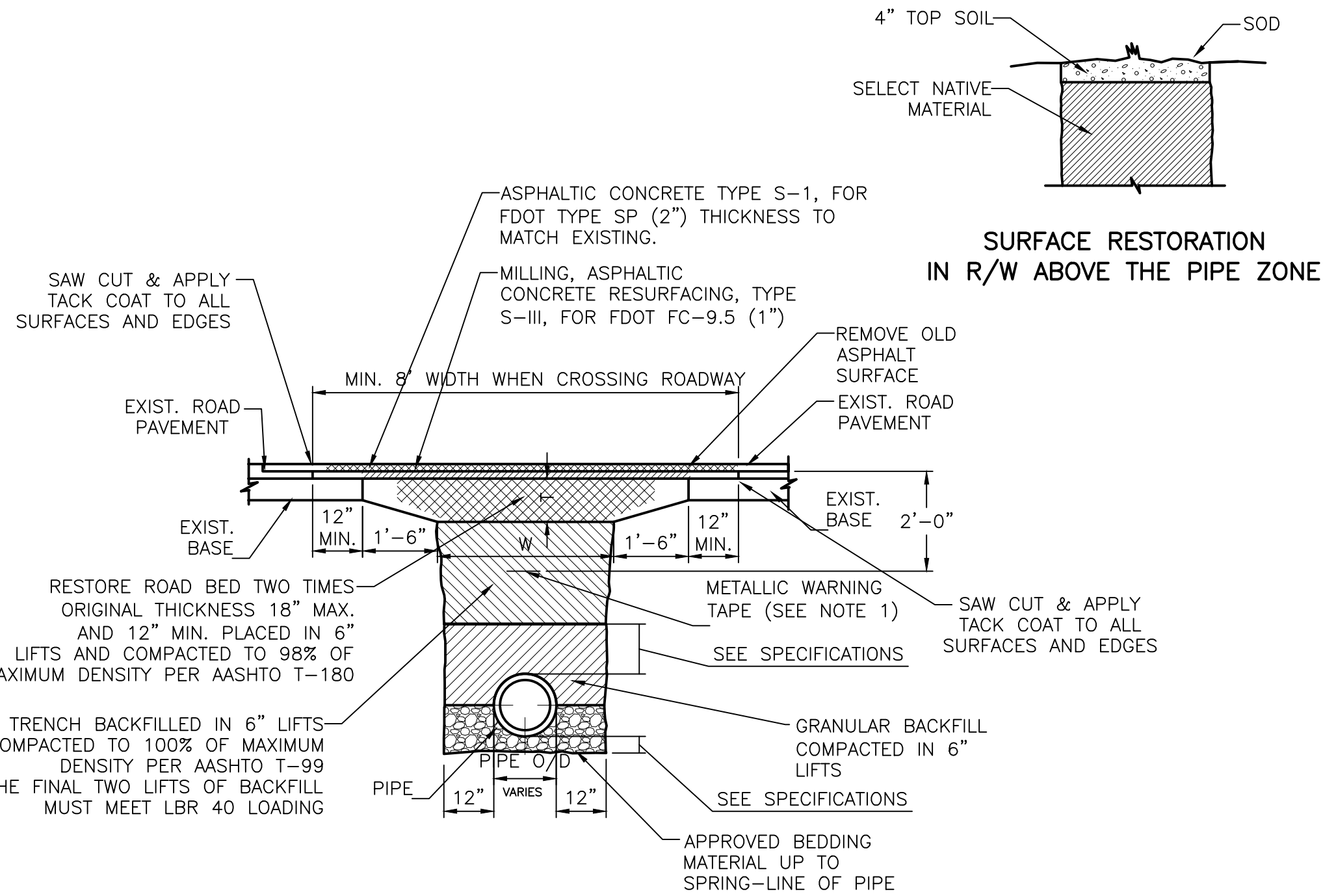
LMO	3/8"=1'-0"
-----	------------

CHECKED BY: _____

SE	FIELD BOOK:
----	-------------

]

100 North Andrews Avenue, Fort Lauderdale, Florida 33301



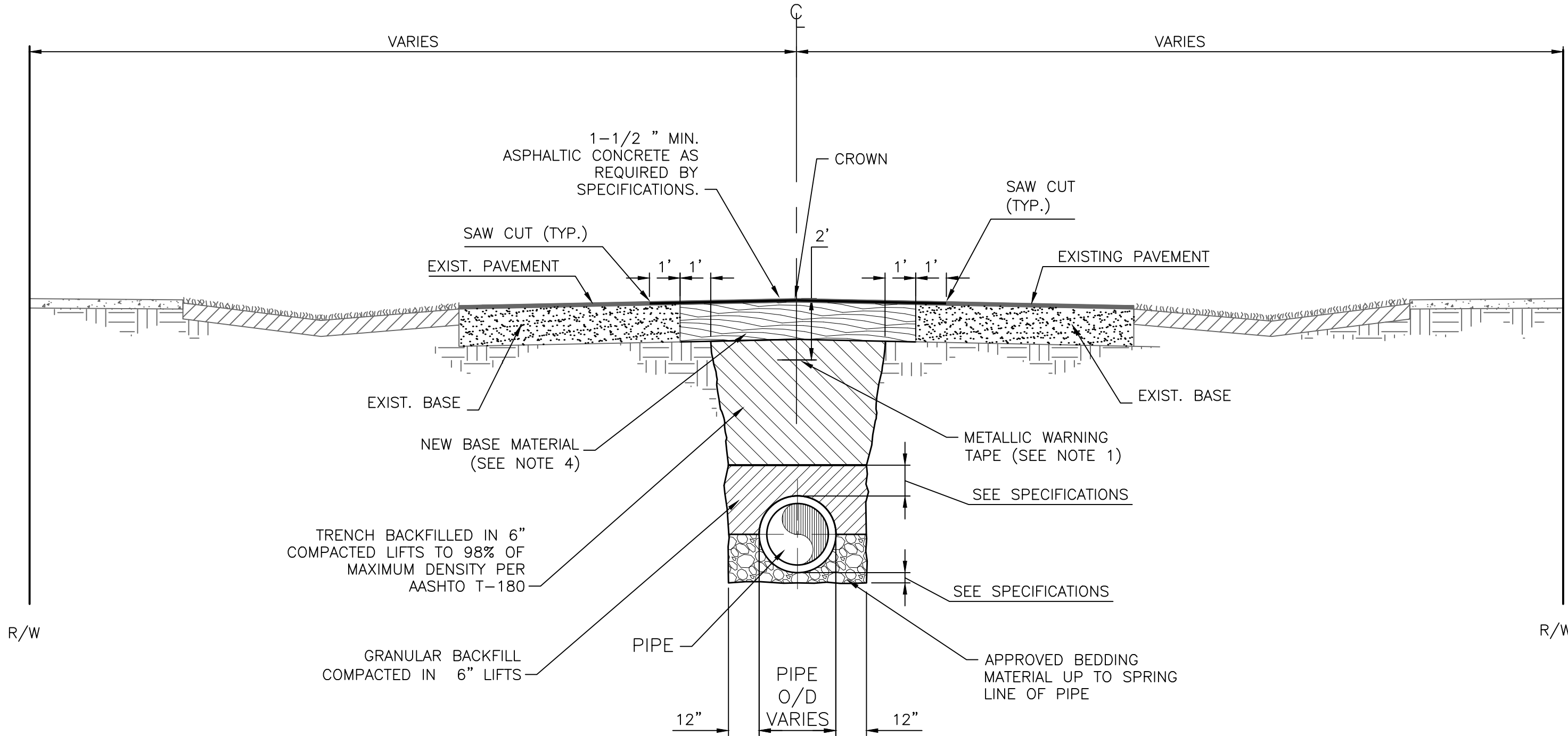
RIGHT OF WAY
TRENCH REPAIR, MILLING, AND OVERLAY

NOTES:

1. METALLIC WARNING TAPES SHALL BE INSTALLED 24" BELOW FINISH GRADE ABOVE MAIN. (SEE SPECIFICATION 2320 SECTION 3.6 FOR MARKING TYPE)
2. UNLESS OTHERWISE SPECIFIED SELECTED MATERIAL SHALL BE FREE OF STONES LARGER THAN 3/8" DIA.
3. REPLACE ALL LANE MARKINGS AND REFLECTIVE MARKERS.
- T=6" PARKING
T=8" RESIDENTIAL STREETS
T=10" MAJOR STREETS (4 LANE)
T=12" MAJOR STREETS (6 LANE)
2T=18" MAX. 12" MIN.

TYPICAL TRENCH AND PAVEMENT
RESTORATION FOR TRANSVERSE
CROSSING

100

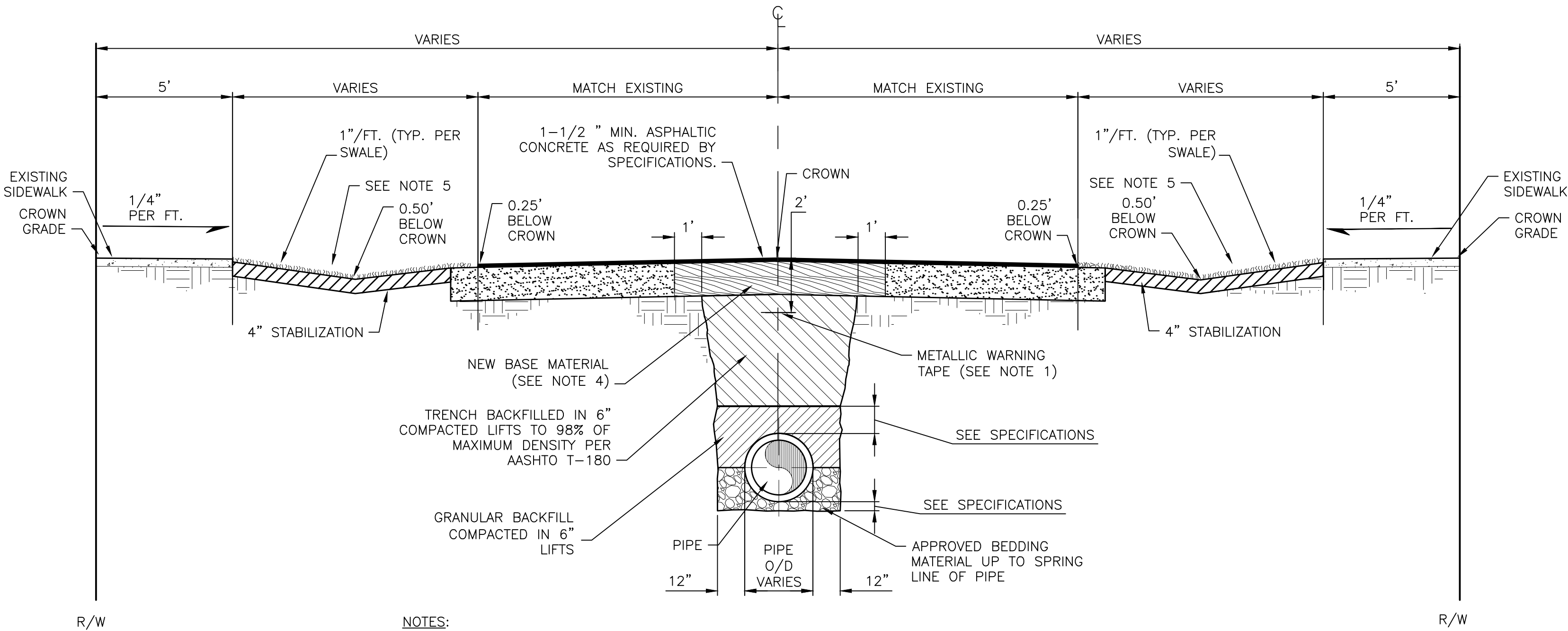


NOTES:

1. 2" WIDE METALLIC WARNING TAPES SHALL BE INSTALLED 24" BELOW FINISH GRADE.
2. UNLESS OTHERWISE SPECIFIED SELECTED MATERIAL SHALL BE FREE OF STONES LARGER THAN 3/8" DIA.
3. REPLACE ALL LANE MARKINGS AND REFLECTIVE MARKERS.
4. 12" MIN. LIMEROCK BASE PLACED IN 6" LAYERS AND COMPACTED TO 98% OF MAXIMUM DENSITY PER AASHTO T-180.

TYPICAL ROAD SECTION, TYPICAL TRENCH AND TRENCH RESTORATION FOR PARALLEL
PIPE TRENCH

100A



NOTES:

1. 2" WIDE METALLIC WARNING TAPES SHALL BE INSTALLED 24" BELOW FINISH GRADE. DOES NOT APPLY TO STORM DRAINAGE PIPE INSTALLATION.
2. UNLESS OTHERWISE SPECIFIED SELECTED MATERIAL SHALL BE FREE OF STONES LARGER THAN 3/8" DIA.
3. REPLACE ALL LANE MARKINGS AND REFLECTIVE MARKERS.
4. 12" MIN. LIMEROCK BASE PLACED IN 6" LAYERS AND COMPACTED TO 98% OF MAXIMUM DENSITY PER AASHTO T-180
5. BAHIA SOD -OR- ST. AUGUSTINE "FLORITAM" SOD IN PREVIOUSLY SODDED AREAS -OR- REPLACE EXISTING IMPROVED SURFACE (e.g., ROCK OR ASPHALT PAVING TO MATCH EXISTING -IF ASPHALT, MINIMUM 1" ASPHALT OVER MINIMUM 6" COMPACTED LIMEROCK)

TYPICAL ROAD SECTION, TYPICAL TRENCH, PAVEMENT AND SWALE
RESTORATION FOR PARALLEL PIPE TRENCH

100B

NO.	DATE	BY	CHK'D	REVISIONS	
				DESCRIPTION	DETAIL 100B MODIFIED
1	12/07				

FLA. P.E. NO.

51915
STAN EDWARDS

DATE: JULY 2016

DRAWN BY: ENG

DESIGNED BY: SCALE: N.T.S.

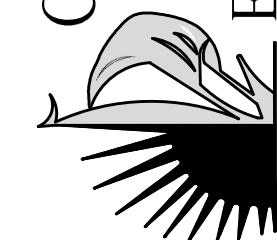
WW2011

CHECKED BY: WW2011

FIELD BOOK:

CITY OF FORT LAUDERDALE

PUBLIC WORKS DEPARTMENT



ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

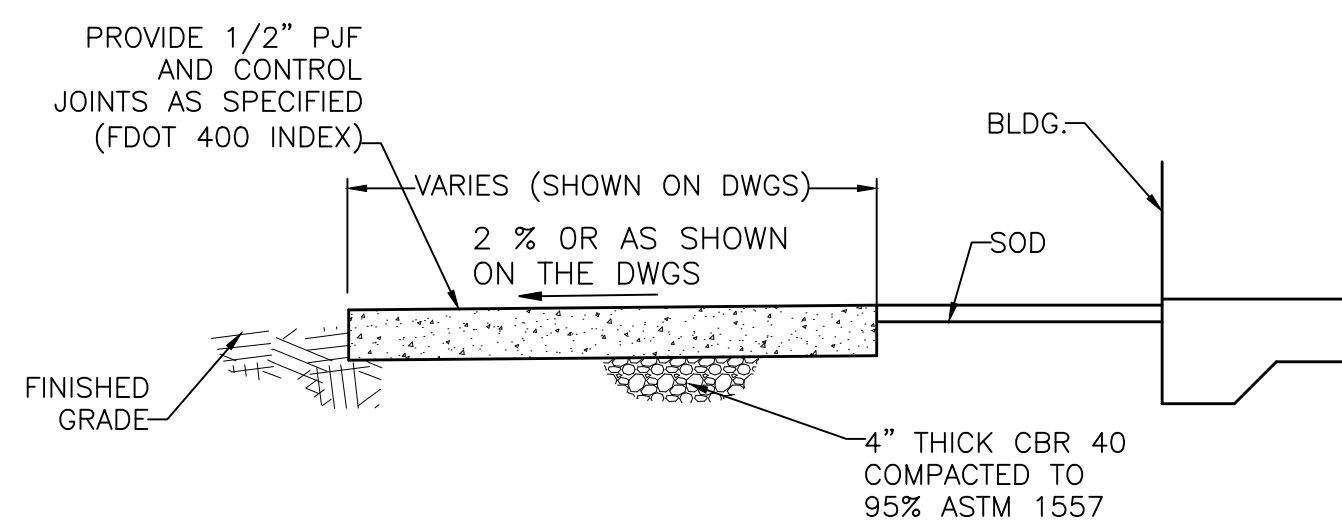
REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D
1	7/07	R.C.	

PROJECT # 11880
PUPM STATION REHAB
SANITARY SEWER PUMP STATION A-12
CIVIL DETAILS
900 AVOCADO ISLE

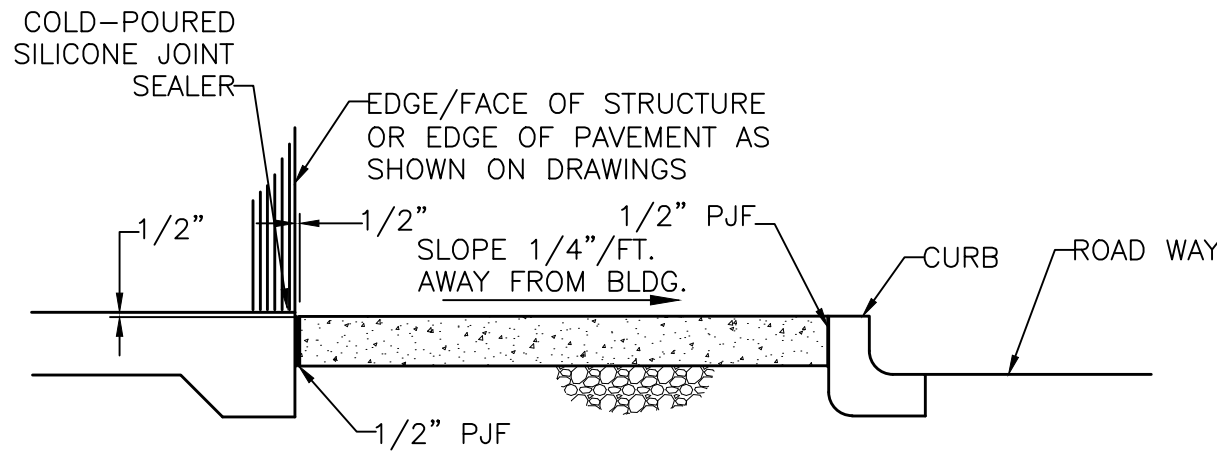
SHEET NO.	OF
C-9	15
TOTAL:	31
CAD FILE:	
11880-C09-DETL	
DRAWING FILE NO.	
4-137-1424	

PERMIT SET

CIVIL DETAILS

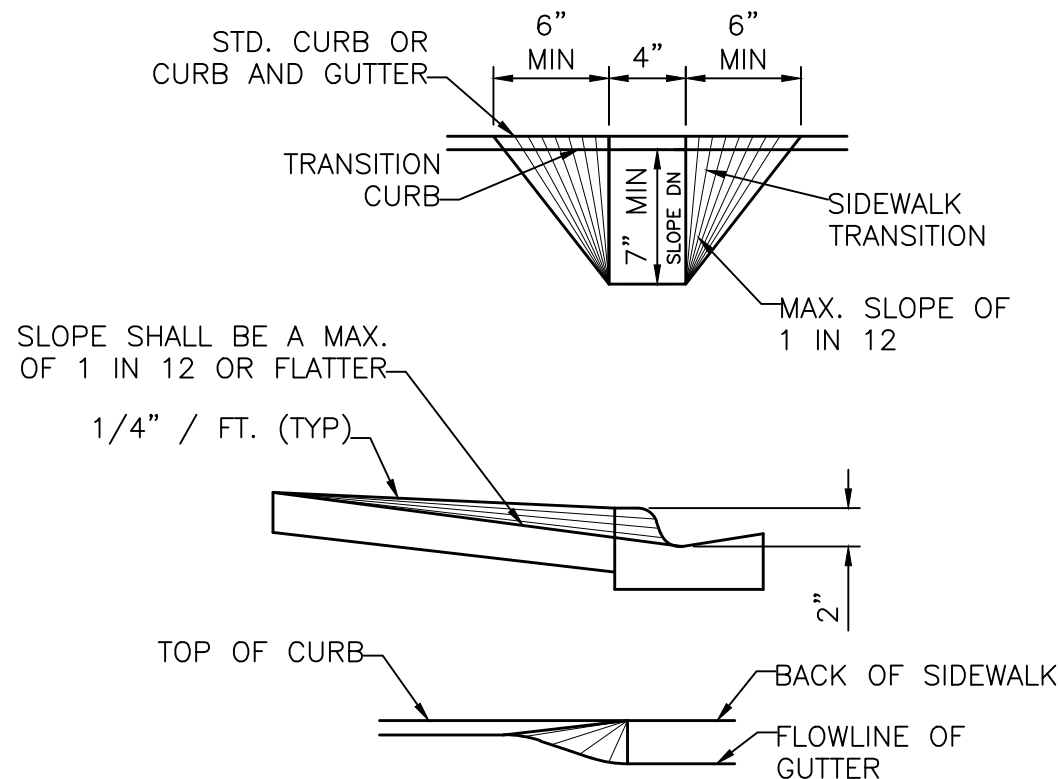


TYPICAL SECTION



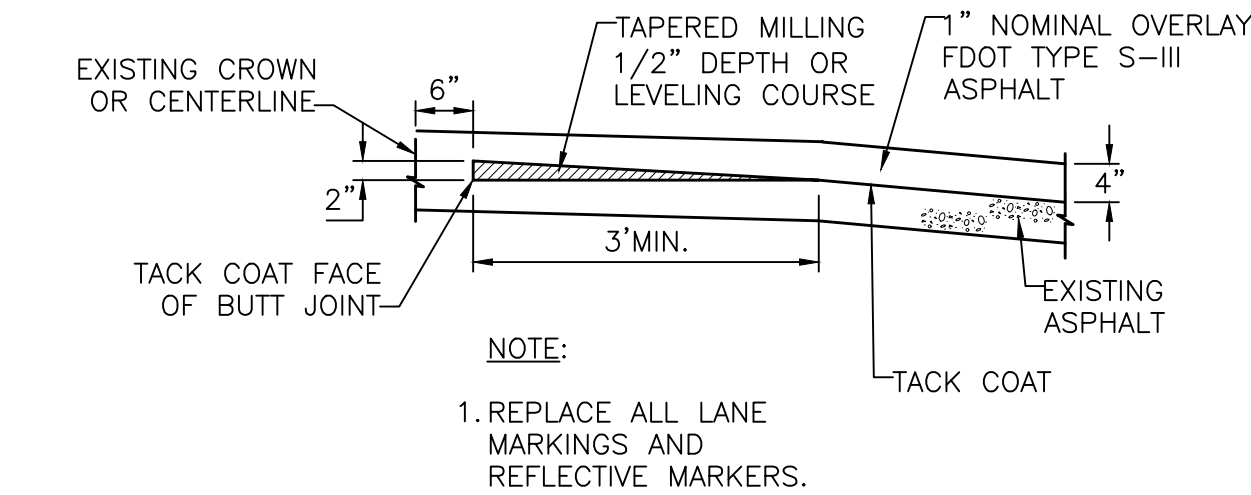
END CONDITION

TYPICAL SIDEWALK DETAILS 103

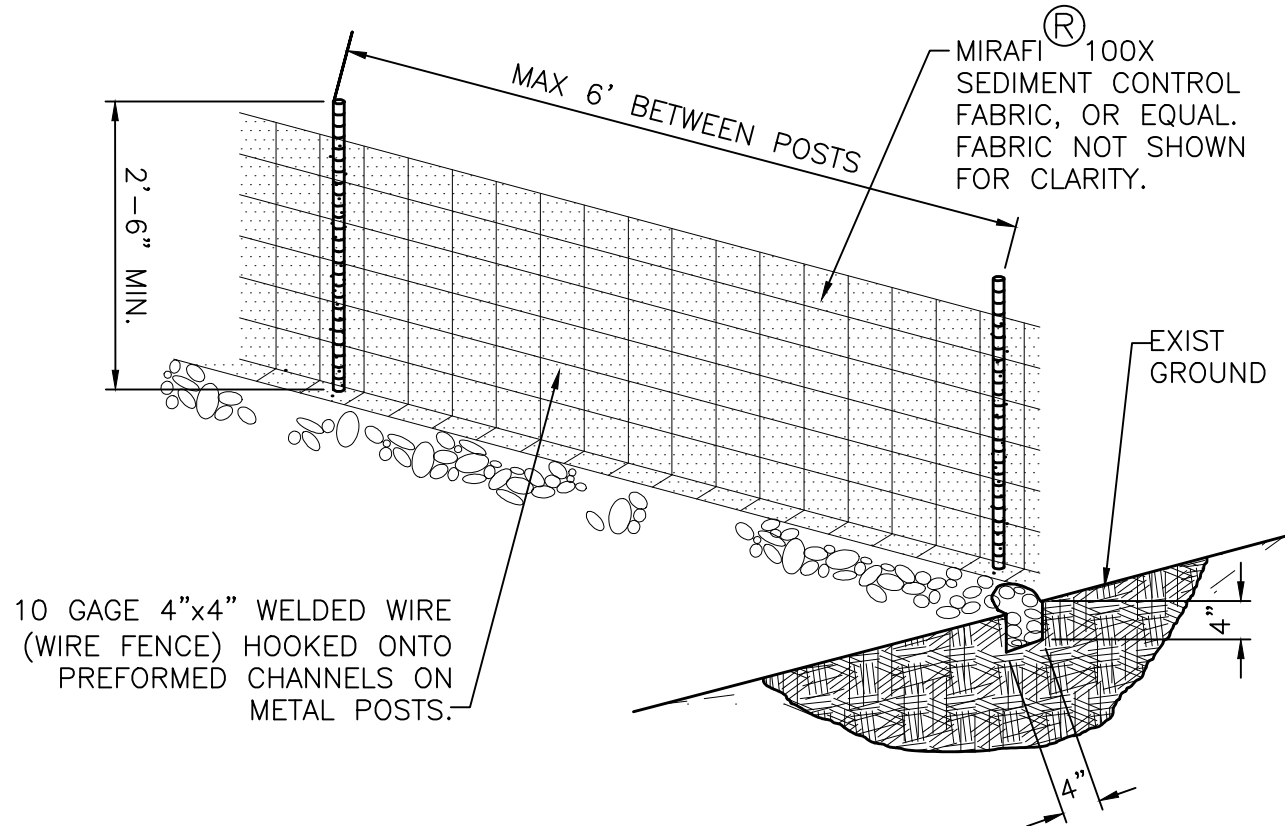


- NOTES:
- RAMP PLACEMENT TO BE DETERMINED BY THE ENGINEER IN THE FIELD.
 - WHERE RIGHT-OF-WAY DOES NOT ALLOW 7' RAMP, PROFILE AT BACK OF SIDEWALK MAY BE ADJUSTED TO MAINTAIN 1 IN 12 SLOPE ON RAMP.
 - RAMP IN ACCORDANCE WITH FAC (FLORIDA ACCESSIBILITY CODE) FDOT INDEX #304.

CURB RAMP 104

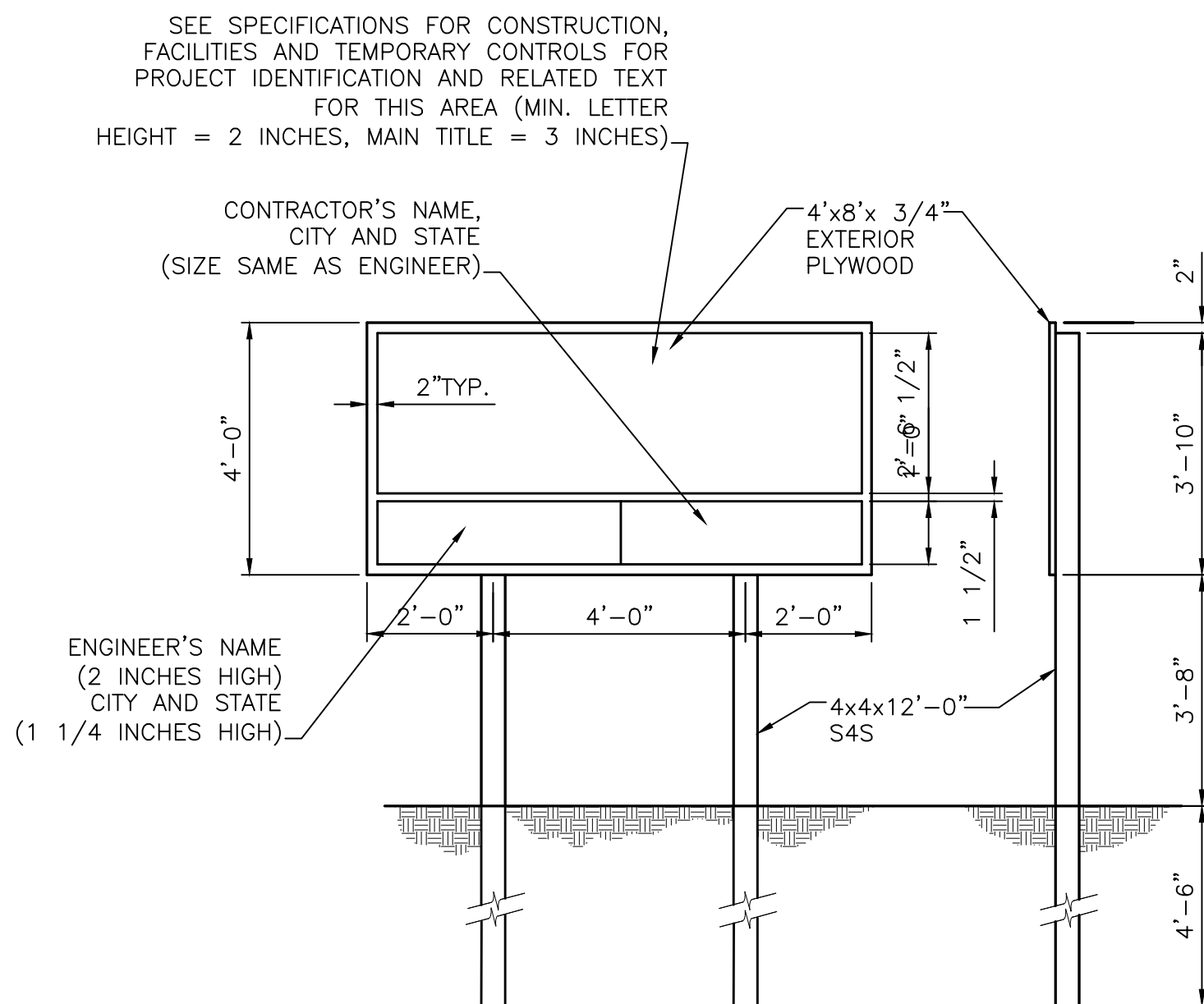


ASPHALT TAPER DETAIL 101



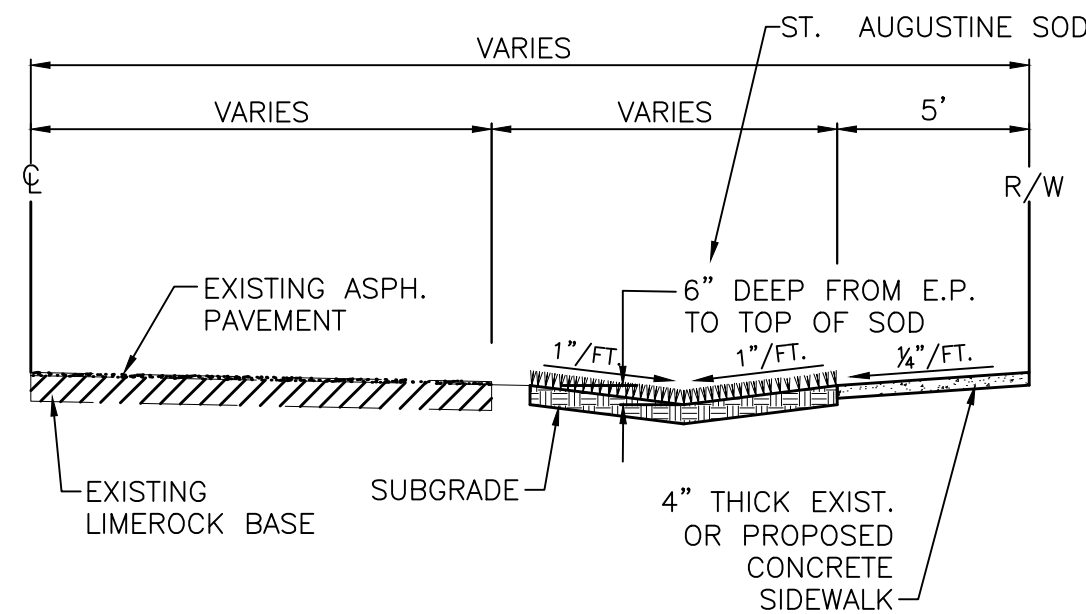
- NOTES:
- DRIVE WOOD POSTS (1.3 LBS/FT MIN) 18" MIN INTO GROUND AND EXCAVATE A 4"x4" TRENCH UPHILL 5' LONG (MIN) ALONG LINE OF POSTS. WOOD.
 - POSTS 4" IN DIAMETER OR 2"x4" MAY BE USED. ATTACH WIRE FENCE TO POSTS AND EXTEND THE BOTTOM OF THE FENCE 8" INTO THE EXCAVATED TRENCH. ALTERNATE : USE SEDIMENT CONTROL FABRIC WITH PRE-SEWN POCKETS FOR POSTS SO THAT WIRE FENCE IS NOT REQ'D.
 - ATTACH THE SEDIMENT CONTROL FABRIC (36" WIDE) TO THE WIRE FENCE W/METAL CLIPS OR WIRE AND EXTEND THE BOTTOM OF THE FABRIC 6" INTO THE TRENCH.
 - BOTTOM OF SEDIMENT CONTROL FABRIC MUST BE PLACED IN TRENCH AND SECURED WITH GRANULAR FILL TO A HEIGHT OF 6" ABOVE GROUND LEVEL, SO THAT RUNOFF IS FORCED TO GO THROUGH THE FENCE AND CANNOT GO UNDER IT.
 - SILT FENCE SHALL BE MAINTAINED AND TRAPPED SEDIMENTS SHALL BE REMOVED BY THE CONTRACTOR PERIODICALLY AS DETERMINED BY THE ENGINEER OR AS NECESSARY (MAX. 6 MONTHS).
 - THE CONTRACTOR IS REQUIRED TO REMOVE ALL SILT FENCES AND AREA TO BE RESTORED TO THE ORIGINAL CONDITION UPON COMPLETION OF CONSTRUCTION.

SILT FENCE DETAIL 105



NOTE:
LETTERS SHALL BE HELVETICA
MEDIUM BLUE (PANTONE 301)
ON WHITE BACKGROUND. BORDER
SHALL BE BLUE (PANTONE 301)

PROJECT SIGN 108



NOTE:
CONTRACTOR SHALL CENTER BOTTOM OF SWALE BETWEEN
EDGE OF PAVEMENT AND R/W LINE IF NO SIDEWALK EXISTS.

SWALE PROFILE

PLOT DATE: July 8, 2016

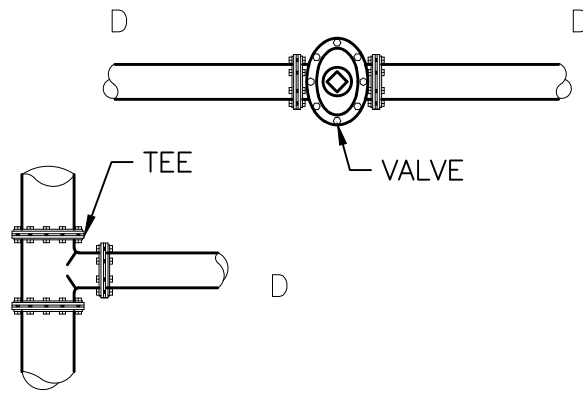
PRESS01

MINIMUM RESTRAINED
JOINT LENGTH FOR
PRESSURE MAINS

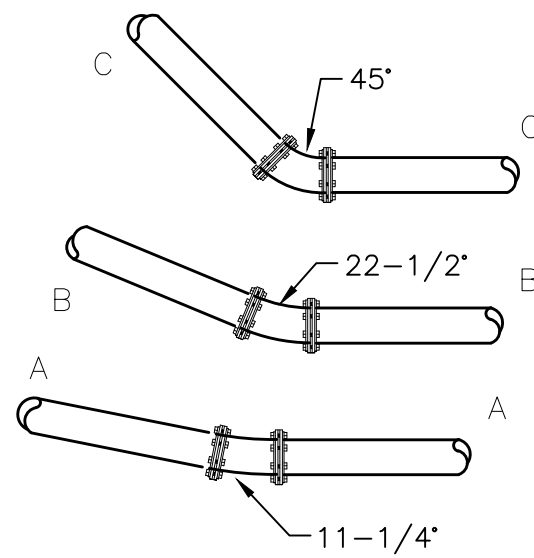
409

- NOTE:
- FOR PIPE SIZE OVER 24" SEE SPECIFICATIONS
 - RESTRAIN AS SHOWN ON DRAWINGS.

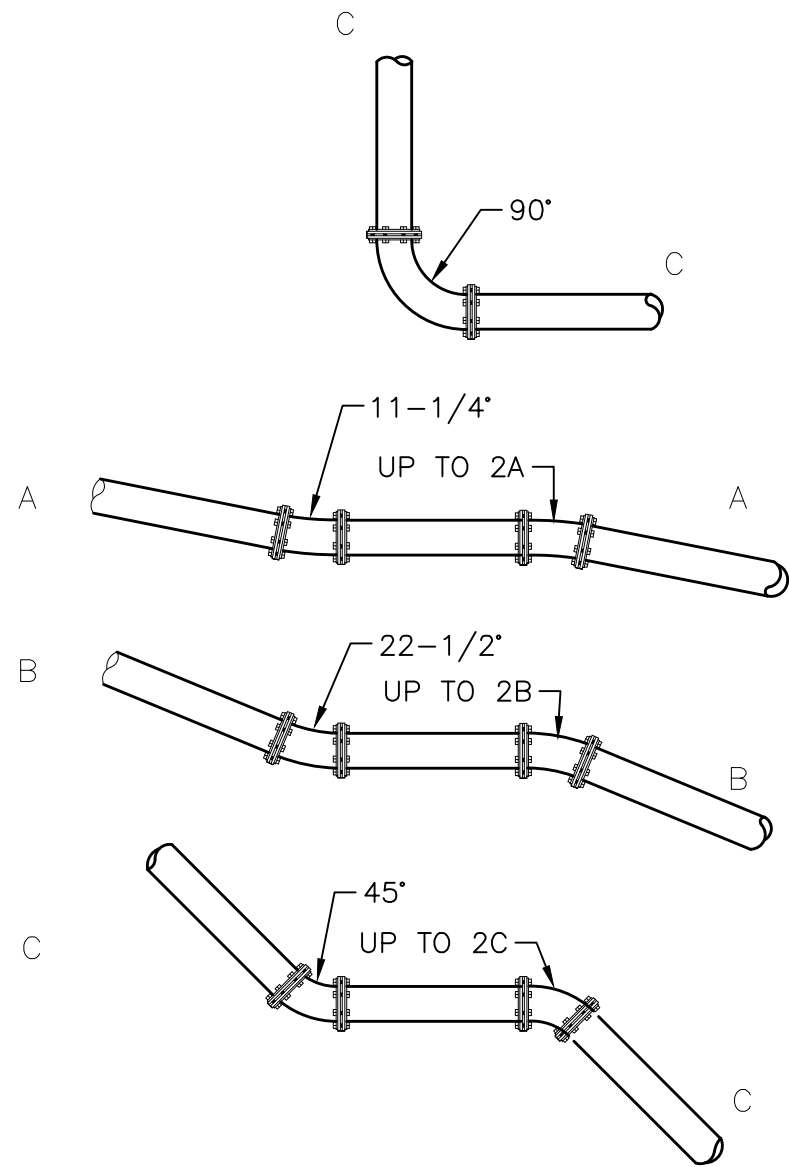
SIZE	DISTANCE IN FEET			
	A & B	C	D	
4"	18	18	54	
6"	18	18	72	
8"	18	36	90	
10"	18	36	108	
12"	18	36	126	
14"	18	54	144	
16"	18	54	162	
18"	18	54	180	
20"	18	72	198	
24"	18	72	216	



DEAD ENDS



DEFLECTIONS



OFFSETS

90°

11-1/4"

UP TO 2A

22-1/2"

UP TO 2B

45°

UP TO 2C

FLA. P.E. NO.
51915
STAN EDWARDS

DRAWN BY: DATE: JULY 2016

ENG

DESIGNED BY: SCALE: N.T.S.

WW2011

CHECKED BY: WW2011

FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
PRESSURE PIPE DETAILS
900 AVOCADO ISLE

SHEET NO.
C-10

OF
15

TOTAL: 31

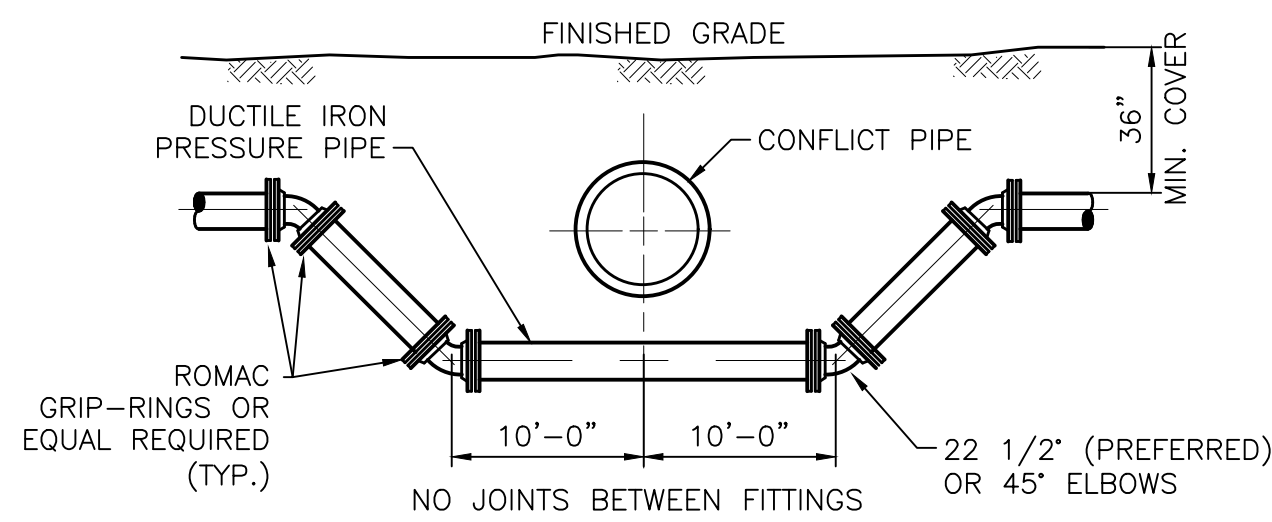
CAD FILE: 11880-C10-DETL

DRAWING FILE NO. 4-137-1424

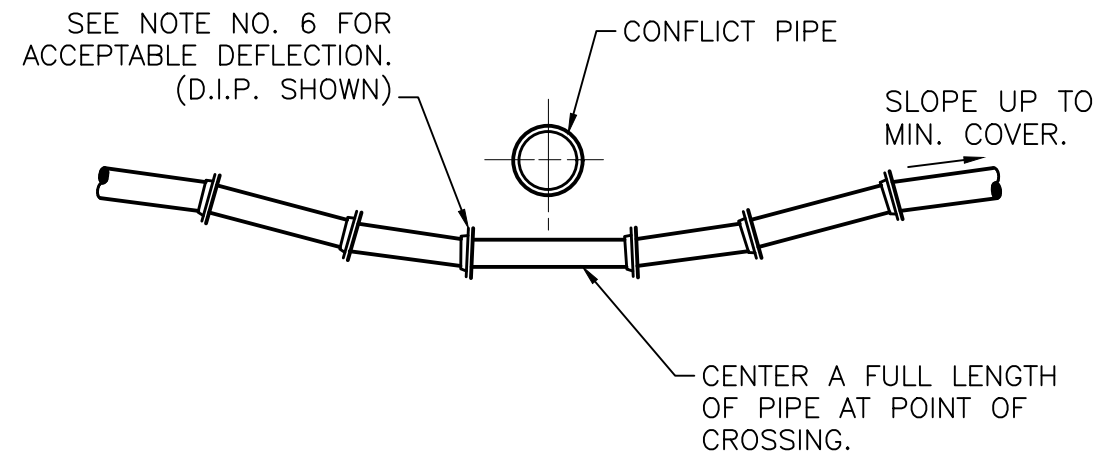
PRESSURE PIPE DETAILS

BID SET

7/29/2016 4:28 PM p. 639



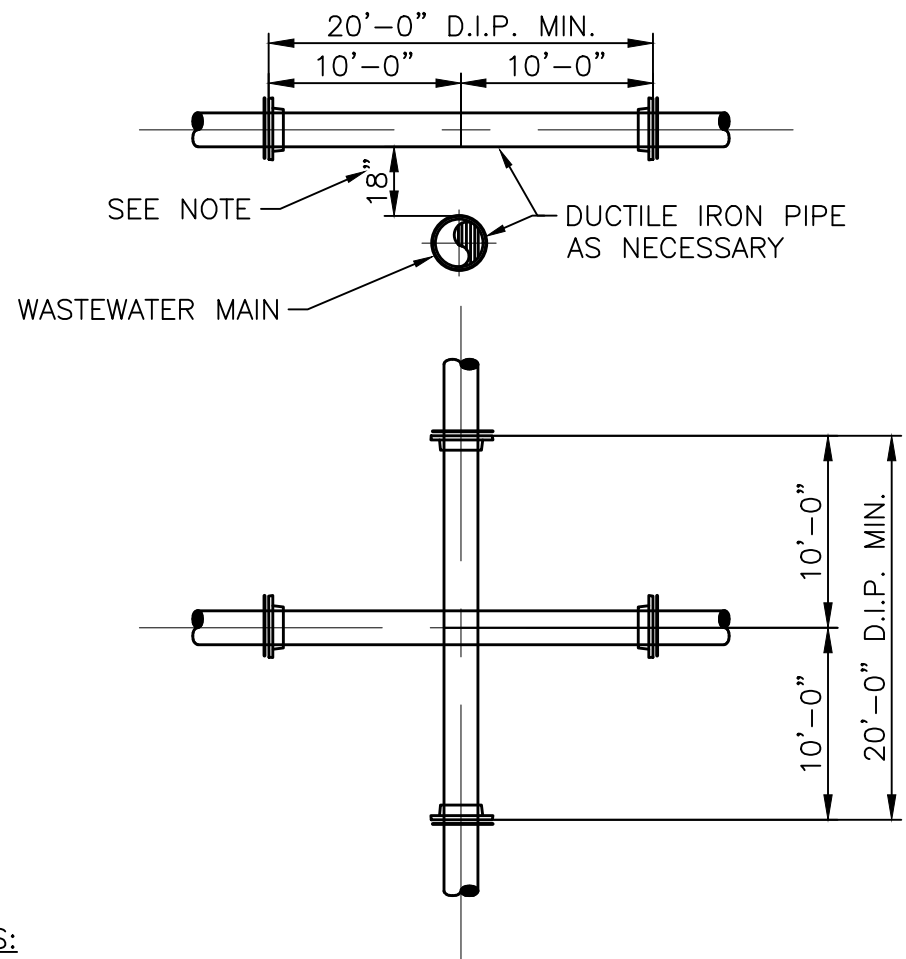
FITTING TYPE



DEFLECTION TYPE

PRESSURE PIPE CONFLICT DETAIL

400

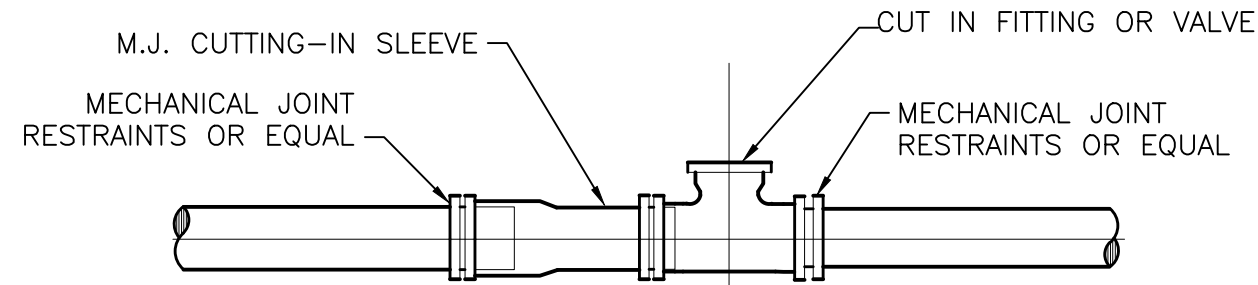


NOTES:

1. STORM SEWER, GRAVITY WASTEWATER AND RECLAIMED WATER MAIN CROSSING UNDER POTABLE WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF EIGHTEEN (18) INCHES BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE STORM/WASTEWATER/RECLAIMED WATER PIPE JOINTS AND POTABLE WATER MAIN JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN TEN (10) FEET BETWEEN ANY TWO JOINTS, BOTH PIPES SHALL BE D.I.P., AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6 INCHES. WHERE THERE IS NO ALTERNATIVE TO STORM/WASTEWATER/RECLAIMED WATER PIPES CROSSING OVER A POTABLE WATER MAIN, THE CRITERIA FOR MINIMUM 18" VERTICAL SEPARATION BETWEEN LINES AND JOINT ARRANGEMENT, AS STATED ABOVE, SHALL BE REQUIRED, AND BOTH PIPES SHALL BE D.I.P. IRRESPECTIVE OF SEPARATION. D.I.P. IS NOT REQUIRED FOR STORM SEWERS.
2. MAINTAIN MIN. TEN (10) FEET HORIZONTAL DISTANCE BETWEEN POTABLE WATER MAIN AND STORM SEWER, WASTEWATER MAIN, OR FORCE MAIN. MAINTAIN MIN. THREE (3) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN RECLAIMED WATER MAIN AND POTABLE WATER MAIN, STORM SEWER, WASTEWATER GRAVITY MAIN OR FORCE MAIN.
3. FORCE MAIN CROSSING POTABLE WATER MAIN OR RECLAIMED WATER MAIN SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF EIGHTEEN (18) INCHES BETWEEN THE OUTSIDE OF THE FORCE MAIN AND OUTSIDE OF THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN WITH THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN CROSSING OVER THE FORCE MAIN.

STANDARD WATER AND SEWER SEPARATION DETAIL

402

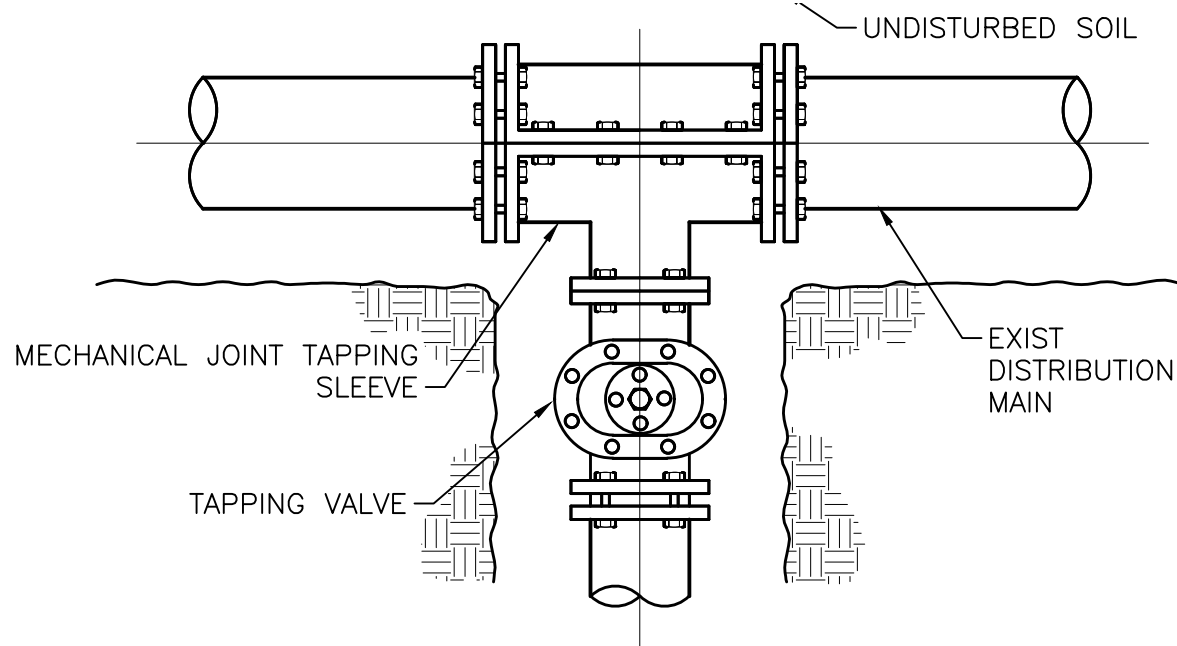


DUCTILE IRON-MECHANICAL JOINT (FORCE MAIN)

1. MECHANICAL JOINTS RESTRAINTS ARE REQUIRED THROUGHOUT ASSEMBLY.

PRESSURE PIPE STANDARD CUT-IN DETAIL

404



PLAN TAPPING TEE ASSEMBLY DETAIL

405

NOTES:

1. STORM SEWER, GRAVITY WASTEWATER AND RECLAIMED WATER MAIN CROSSING UNDER POTABLE WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF EIGHTEEN (18) INCHES BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE STORM/WASTEWATER/RECLAIMED WATER PIPE JOINTS AND POTABLE WATER MAIN JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN TEN (10) FEET BETWEEN ANY TWO JOINTS, BOTH PIPES SHALL BE D.I.P., AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6 INCHES. WHERE THERE IS NO ALTERNATIVE TO STORM/WASTEWATER/RECLAIMED WATER PIPES CROSSING OVER A POTABLE WATER MAIN, THE CRITERIA FOR MINIMUM 18" VERTICAL SEPARATION BETWEEN LINES AND JOINT ARRANGEMENT, AS STATED ABOVE, SHALL BE REQUIRED, AND BOTH PIPES SHALL BE D.I.P. IRRESPECTIVE OF SEPARATION. D.I.P. IS NOT REQUIRED FOR STORM SEWERS.
2. MAINTAIN MIN. TEN (10) FEET HORIZONTAL DISTANCE BETWEEN POTABLE WATER MAIN AND STORM SEWER, WASTEWATER MAIN, OR FORCE MAIN. MAINTAIN MIN. THREE (3) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN RECLAIMED WATER MAIN AND POTABLE WATER MAIN, STORM SEWER, WASTEWATER GRAVITY MAIN OR FORCE MAIN. VERTICAL DISTANCE OF EIGHTEEN (18) INCHES BETWEEN THE OUTSIDE OF THE FORCE MAIN AND OUTSIDE OF THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN WITH THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN CROSSING OVER THE FORCE MAIN.
3. FORCE MAIN CROSSING POTABLE WATER MAIN OR RECLAIMED WATER MAIN SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF EIGHTEEN (18) INCHES BETWEEN THE OUTSIDE OF THE FORCE MAIN AND OUTSIDE OF THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN WITH POTABLE WATER MAIN OR RECLAIMED WATER MAIN CROSSING OVER THE FORCE MAIN.
4. FITTINGS SHALL BE RESTRAINED.
5. THE DEFLECTION TYPE CROSSING IS PREFERRED.
6. DO NOT EXCEED 75% OF MANUFACTURER'S RECOMMENDED MAXIMUM JOINT DEFLECTION FOR DUCTILE IRON PIPE. NO DEFLECTION AT THE JOINT IS ALLOWED FOR P.V.C. PIPE. BENDING OF P.V.C. PIPE SHALL NOT EXCEED THE FOLLOWING PARAMETERS:

PVC PIPE SIZE (INCH)	MIN. ALLOWED RADIUS (FT.)	MAX. DEFLECTION (INCH) PER 20' LENGTH
6"	300	8"
8"	400	6"
10"	600	4"
12"	600	4"

PRESSURE PIPE CONFLICT NOTES

401

I. FORCE MAIN AND WATER MAIN OUTSIDE OF WELLFIELD PROTECTION ZONE
MAXIMUM QUANTITY OF WATER (GALLONS PER HOUR) THAT MAY BE SUPPLIED TO MAINTAIN PRESSURE WITHIN 5 P.S.I. OF THE SPECIFIED TEST PRESSURE.

(MECHANICAL OR PUSH-ON JOINT, 18 FT. NOMINAL LENGTHS, PER 1000 FT. OF PIPE)

AVG. TEST PRESSURE	PIPE DIAMETER (INCHES)
PSI	4 6 8 10 12 14 16 18 20 24 30
150	0.33 0.50 0.66 0.83 0.99 1.16 1.32 1.49 1.66 1.99 2.48

AVG. TEST PRESSURE	PIPE DIAMETER (INCHES)
PSI	36 42 48 54 60
150	2.98 3.48 3.97 4.47 4.97

NOTES:

1. TO OBTAIN THE MAXIMUM QUANTITY OF WATER FOR PIPE WITH 20 FT. NOMINAL LENGTHS, MULTIPLY THE QUANTITY CALCULATED FROM THE TABLE BY 0.9.
2. THE MAXIMUM QUANTITY OF ADDED WATER FOR A PIPELINE IS CALCULATED BY MULTIPLYING THE QUANTITY PER HOUR AS OBTAINED FROM THE ABOVE TABLE, BY THE DURATION OF THE TEST IN HOURS, AND BY THE TOTAL LENGTH OF THE LINE BEING TESTED DIVIDED BY 1,000. IF THE LINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE MAXIMUM QUANTITY ADDED WILL BE THE SUM OF THE COMPUTED QUANTITIES FOR EACH SIZE.
3. MAXIMUM TEST LENGTH = 2,500 FEET PER SECTION.
4. THIS STANDARD SHALL REFLECT ANY REVISION OF A.W.W.A. C-600-05. HOWEVER, THE MAXIMUM QUANTITY OF WATER ADDED SHALL NOT EXCEED 50% OF RECOMMENDED LIMIT PER APPLICABLE AWWA C-600-05 STANDARD.
5. STANDARD TEST PRESSURE = 150 P.S.I.
6. FORMULA BASIS: $Q = LD \sqrt{P/148,000}$
 Q = QUANTITY OF MAKEUP WATER, (IN GALLONS PER HOUR)
 L = LENGTH OF PIPE SECTION BEING TESTED (IN FEET)
 D = NOMINAL DIAMETER OF THE PIPE (IN INCHES).
 P = AVERAGE TEST PRESSURE DURING THE HYDROSTATIC TEST (IN POUNDS PER SQUARE INCH GAUGE)
7. PRESSURE TEST DURATION TO BE MIN. 2 HOURS.
8. DISINFECTION OF MAINS SHALL COMPLY WITH A.N.S.I./A.W.W.A. C-651-05 STANDARD.
9. DUCTILE IRON WATER MAIN PIPE SHALL CONFORM TO THE REQUIREMENTS OF A.N.S.I./A.W.W.A. C-151-02.

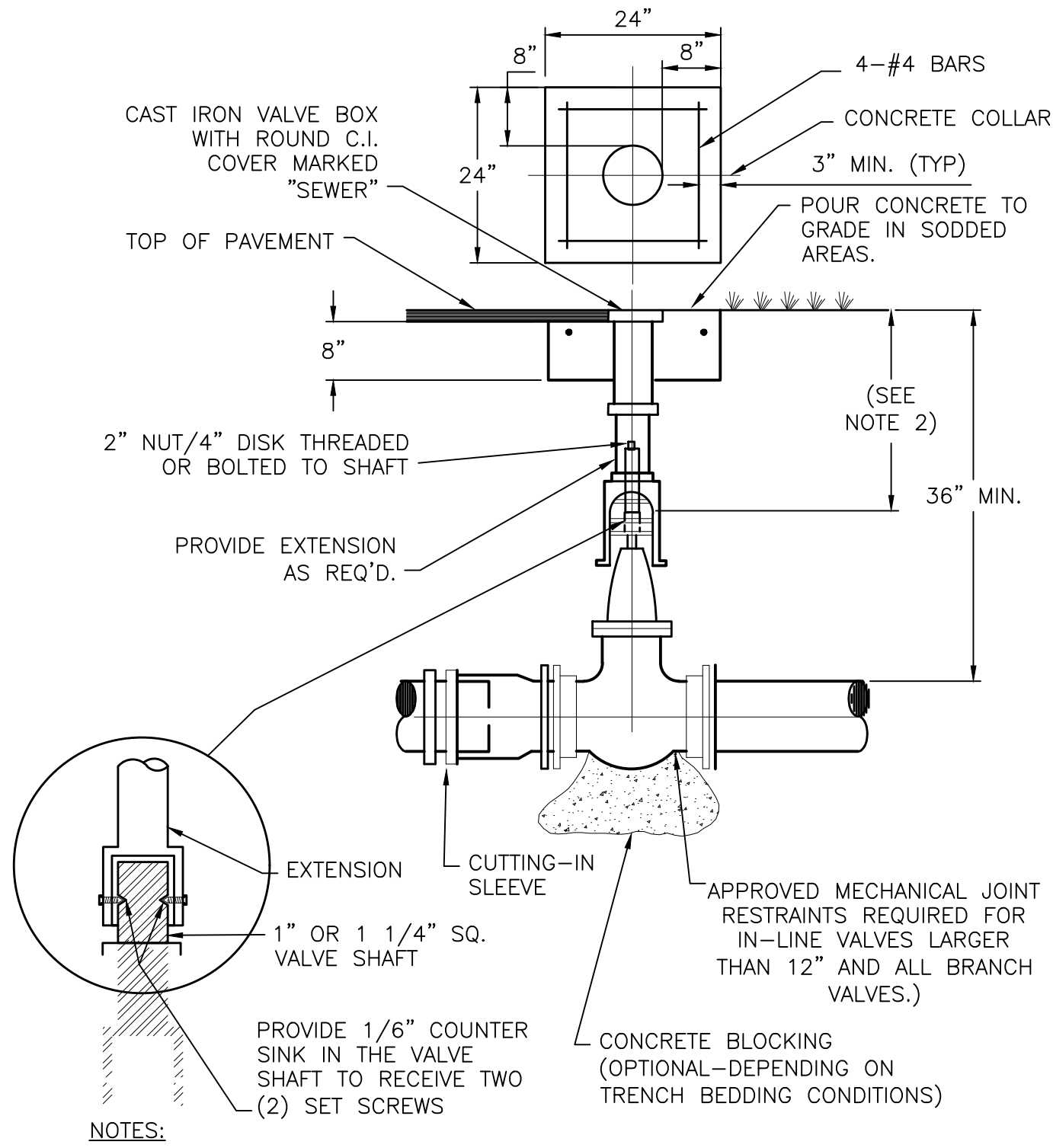
II. FORCE MAIN AND WATER MAIN WITHIN WELLFIELD PROTECTION ZONE.

NOTES:

1. PRESSURE TEST PROCEDURE TO FOLLOW THE CURRENT AWWA C-600-05 STANDARD (150psi, (2) HOUR DURATION). THERE SHALL BE NO PRESSURE DROP IN THE PIPE DURING THE TEST ("ZERO" FILL-UP TOLERANCE).

PRESSURE TEST CRITERIA

403



NOTES:

1. CONCRETE COLLAR IS NOT REQUIRED IN PAVED AREAS IF PAVEMENT SURFACE IS FINISHED PRIOR TO CONDITIONAL FINAL INSPECTION.
2. WHEN VALVE NUT IS DEEPER THAN 36" AN EXTENSION WITH UNIVERSAL JOINT SHALL BE REQUIRED TO BRING OPERATING NUT 24"-30" BELOW FINISHED GRADE. EXTENSION BOLTS & NUTS SHALL BE 316 STAINLESS STEEL. A 316 STAINLESS STEEL CENTERING PLATE SHALL ALSO BE REQUIRED.
3. VALVE BOXES SHALL HAVE LOCKING COVERS MARKED "SEWER" OR "WATER".
4. EXTENSION RISER TO BE D.I.P.
4. AT DEAD END OR WHERE MAIN LINES CHANGE DIRECTION, VALVES SHALL BE RESTRAINED USING MECHANICAL JOINT RESTRAINT.

TYPICAL VALVE DETAIL

406

FLA. P.E. NO.
51915
STAN EDWARDS

DRAWN BY: DATE: JULY 2016

ENG: SCALE: N.T.S.

DESIGNED BY: WW2011

CHECKED BY: WW2011

FIELD BOOK: 33301

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS
NO. DATE BY CH'D DESCRIPTION
1 07.15.10 LMO JP REVISED NOTE
2 11/10 R.C. J.P. UPDATE DETAIL 403

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
PRESSURE PIPE DETAILS
900 AVOCADO ISLE

SHEET NO. OF
C-11 15

TOTAL: 31

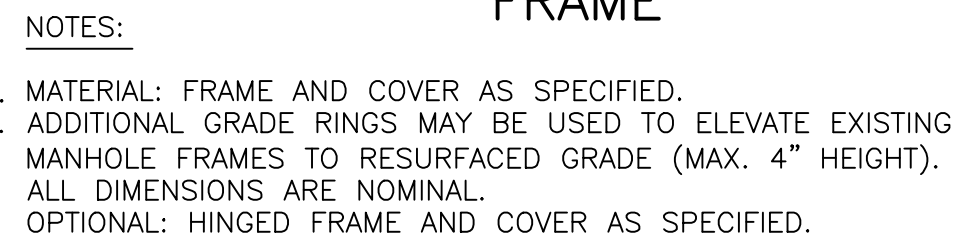
CAD FILE: 11880-C11-DET

DRAWING FILE NO. 4-137-1424

7/29/2016 4:28 PM

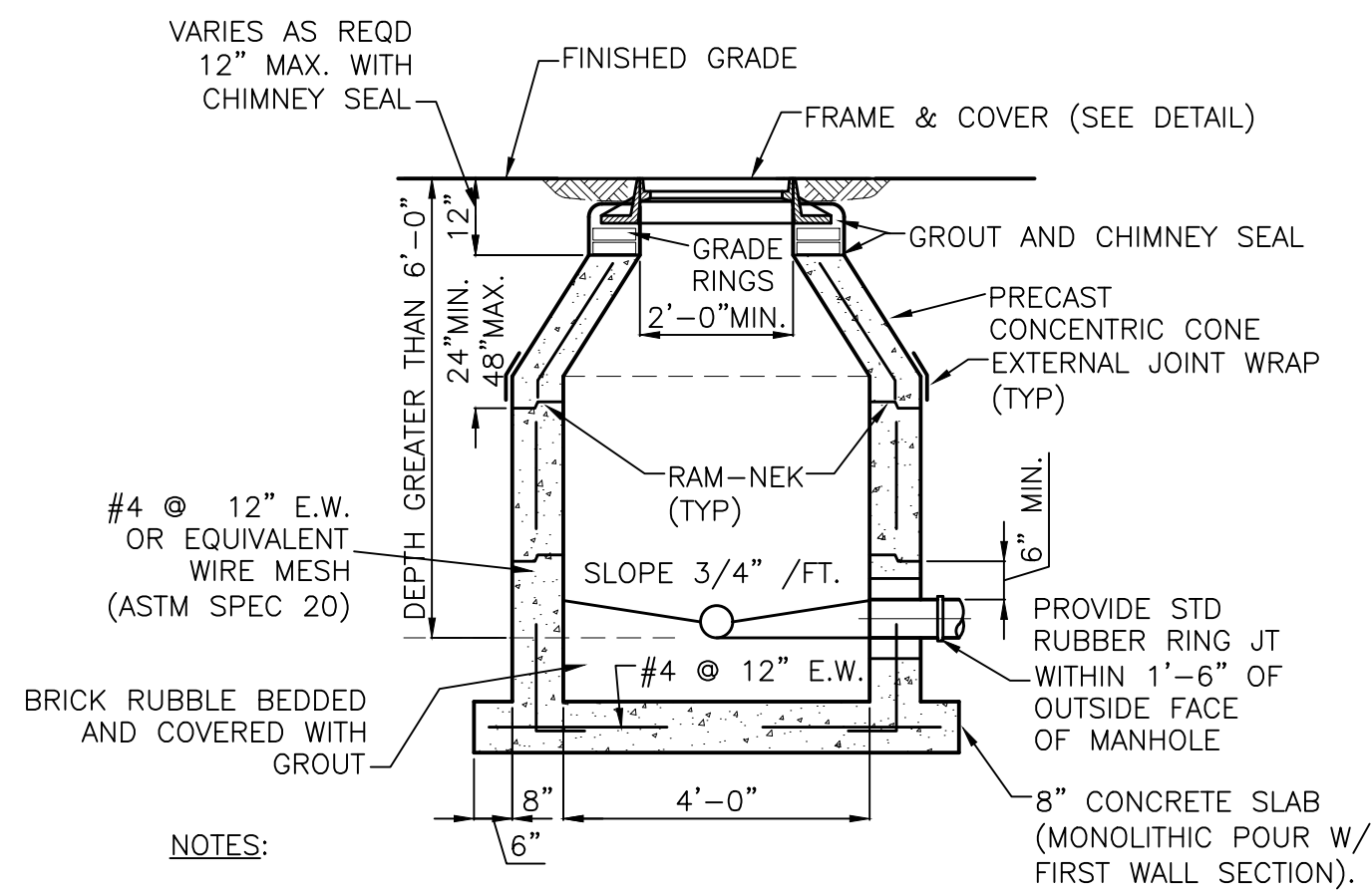
Page 640 of 663

p. 640



MANHOLE FRAME &
COVER-PAVED AREAS

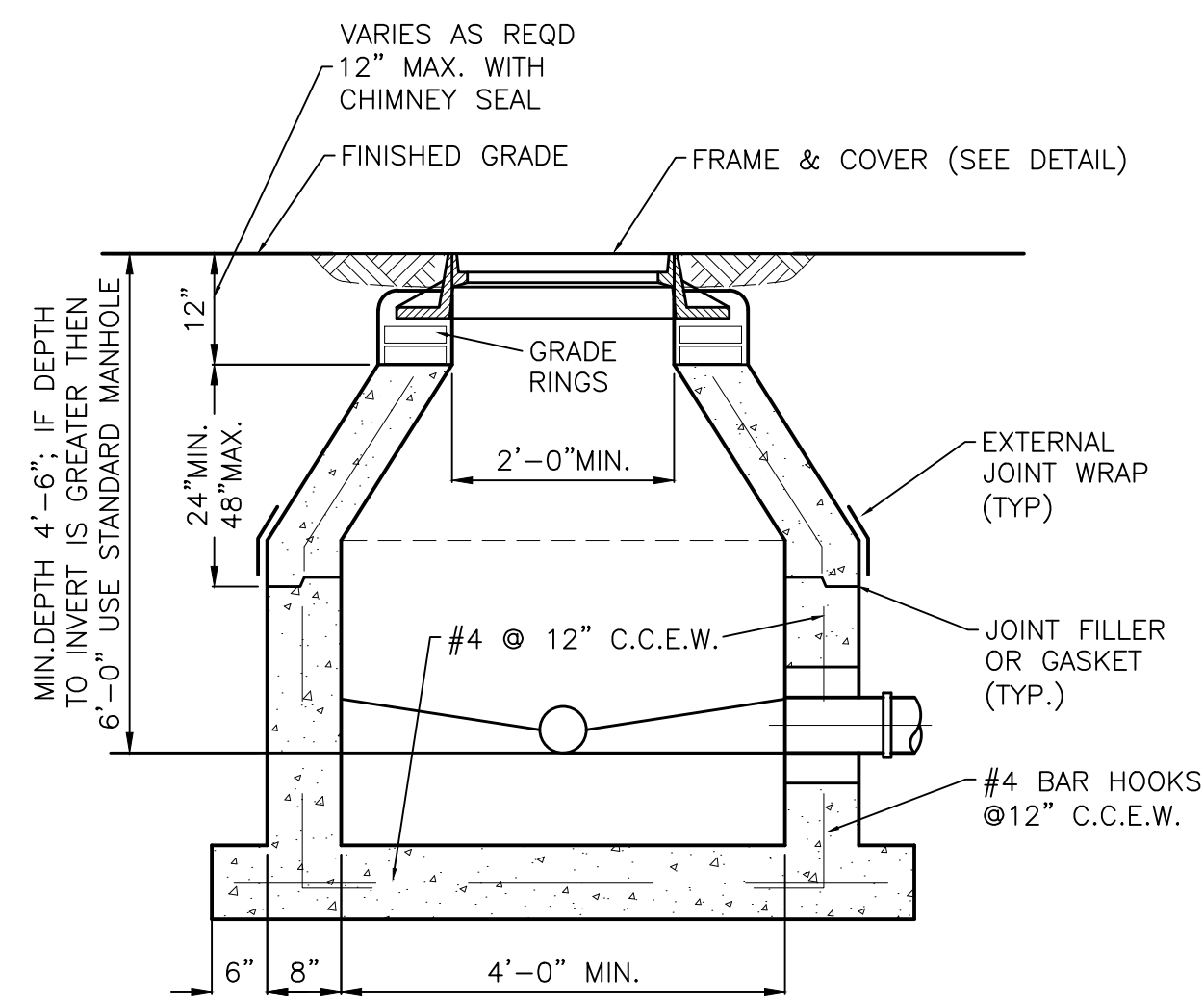
(200



- NOTES: 6" (MONOLITHIC
FIRST WALL SE
1. PRECAST CONCRETE TYPE II 4000 P.S.I.
 2. "RAM-NEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH THE WIDTH AT LEAST 1/2 THE WALL THICKNESS).
 3. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
 4. FLOW CHANNELS SHALL BE CONSTRUCTED TO DIRECT INFLUENT INTO FLOW STREAM. (SEE DETAIL)
 5. LIFT HOLES ARE PERMITTED.
 6. ALL PIPE HOLES SHALL BE PRECAST OR CORE DRILLED.
 7. A. FOR PVC PIPE ENTERING MANHOLE WITH PRECAST HOLES USE THE APPROVED NON-ASBESTOS PVC-MANHOLE ADAPTER OR PRECAST FLEXIBLE MANHOLE SLEEVE FOR THE APPROPRIATE PIPE DIAMETER AND DIMENSION RATIO: THE ADAPTER SHALL NOT EXTEND MORE THAN 1" INTO THE MANHOLE. DOUBLE BANDING IS REQUIRED FOR FLEXIBLE MANHOLE SLEEVE.
 8. B. CONNECTION TO A MANHOLE WITH A CORE DRILLED HOLE SHALL BE MADE USING A 5" MIN. DUCTILE IRON PIPE SECTION (EPOXY LINED) OR THE APPROVED PVC-MANHOLE ADAPTER.
 9. INSIDE DROPS SHALL NOT BE DESIGNED TO EXCEED 1.80 FEET AND NOT CONSTRUCTED TO EXCEED 2.0 FEET. MAX. 6" INSIDE DROP IS PERMITTED FOR MANHOLES WITH 5 OR MORE INVERTS AND MANHOLES WITH A CHANGE IN FLOW DIRECTION OF MORE THAN 45 DEGREES.
 10. MANHOLE FABRICATION SHALL BE IN ACCORDANCE WITH ASTM C-478, LATEST STANDARD.
 11. MINIMUM 5 FEET IS REQUIRED BETWEEN OUTSIDE OF MANHOLE AND SERVICE WYE.
 12. MANHOLES TO BE PAINTED INSIDE AND OUTSIDE WITH 2 COATS OF AN APPROVED PROTECTIVE COATING. (ONE COAT RED, ONE COAT BLACK) MIN. 8-10 MILS D.F.T. PER COAT.
 13. MANHOLE SHALL BE SET PLUMB TO LINE AND GRADE.

STANDARD MANHOLE

(203)

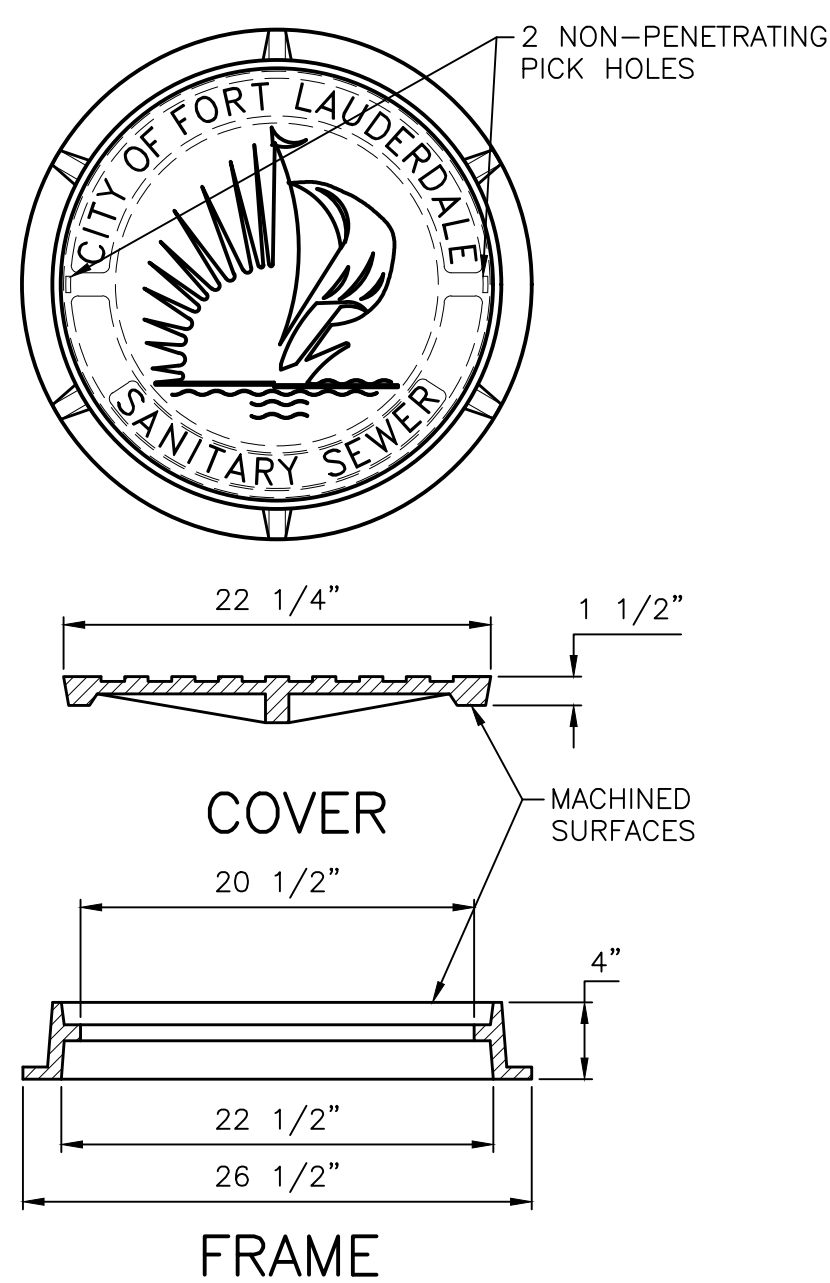


NOTE:

ALL STANDARD MANHOLE NOTES AND DETAILS ARE APPLICABLE

SHALLOW MANHOLE

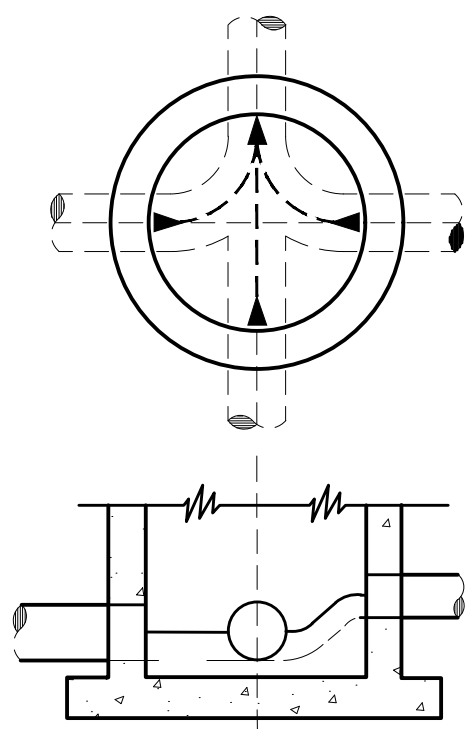
(204



MANHOLE FRAME &
COVER—UNPAVED AREAS

(201

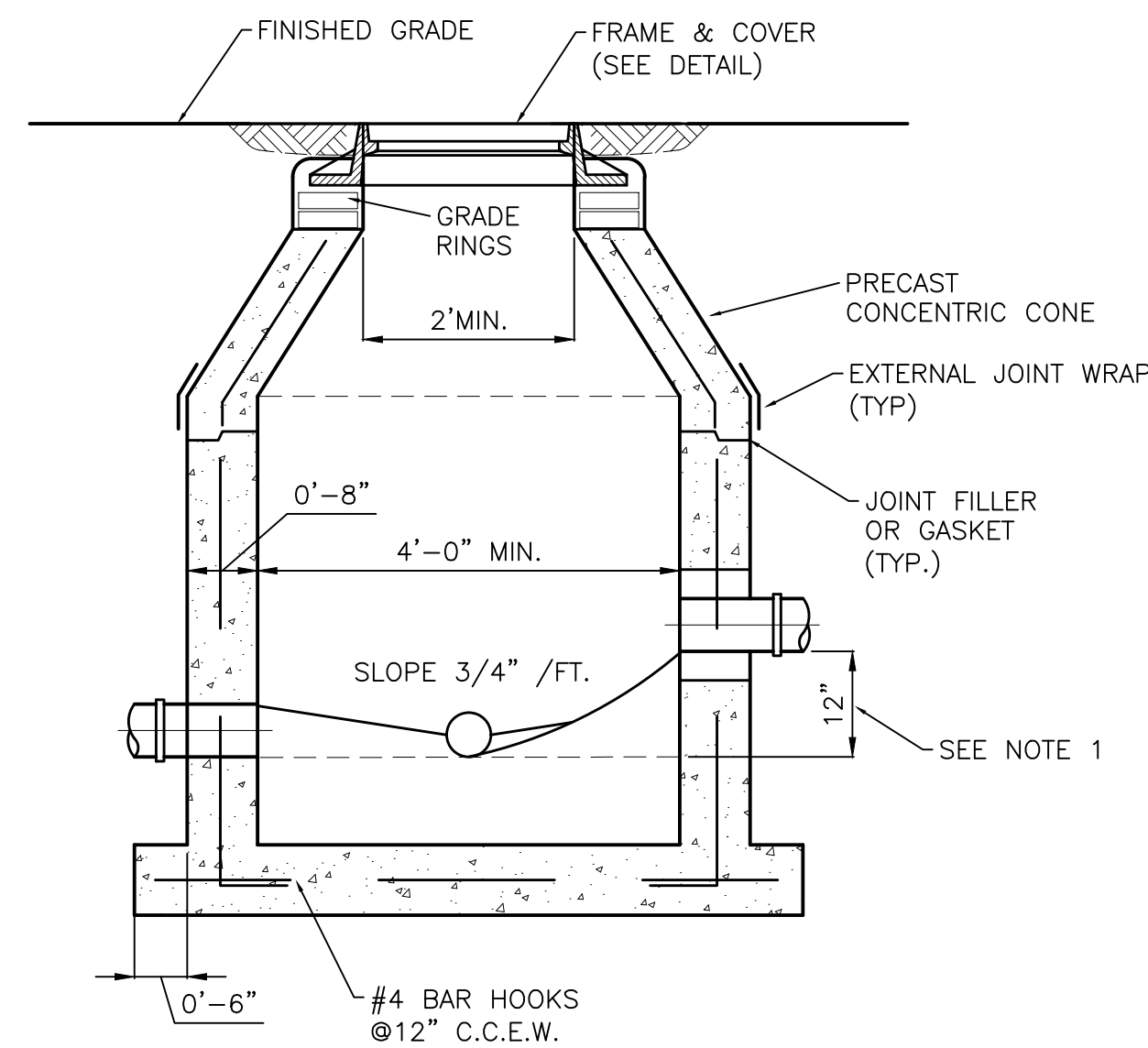
- NOTES:
1. MATERIAL: FRAME AND COVER AS SPECIFIED.
 2. ADDITIONAL GRADE RINGS MAY BE USED TO ELEVATE EXISTING MANHOLE FRAMES TO RESURFACED GRADE (MAX. 4" HEIGHT).
 3. ALL DIMENSIONS ARE NOMINAL.
 4. OPTIONAL: HINGED FRAME AND COVER AS SPECIFIED.



INVERT FLOW CHANNELS

(202

- NOTES:**
1. ALL INVERT CHANNELS ARE TO BE CONSTRUCTED FOR SMOOTH FLOW WITHOUT OBSTRUCTION.
 2. PROPERLY SHAPED SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS TO PROVIDE FOR SMOOTH FLOWS.
 3. SERVICE LATERALS SHALL NOT ENTER MANHOLES UNLESS SPECIFIED ON PLANS AND THEN MUST BE TREATED AS MAINS. (ELEVATIONS SHOWN, PRECAST HOLE, FLOW CHANNEL)
 4. BRICK RUBBLE PERMITTED AS FLOW CHANNEL BUILDUP.
 5. SIDEWALLS OF FLOW CHANNEL SHALL BE AT LEAST HALF OF PIPE HEIGHT AT ALL POINTS.
 6. NO INSIDE DROP LARGER THAN 6" SHALL BE ALLOWED WITH 3 OR 4 INVERTS AND MANHOLES WITH A CHANGE OF DIRECTION OF FLOW OF MORE THAN 45 DEGREES.



DROP CONNECTION PRECAST MANHOLE TYPE A

(205)

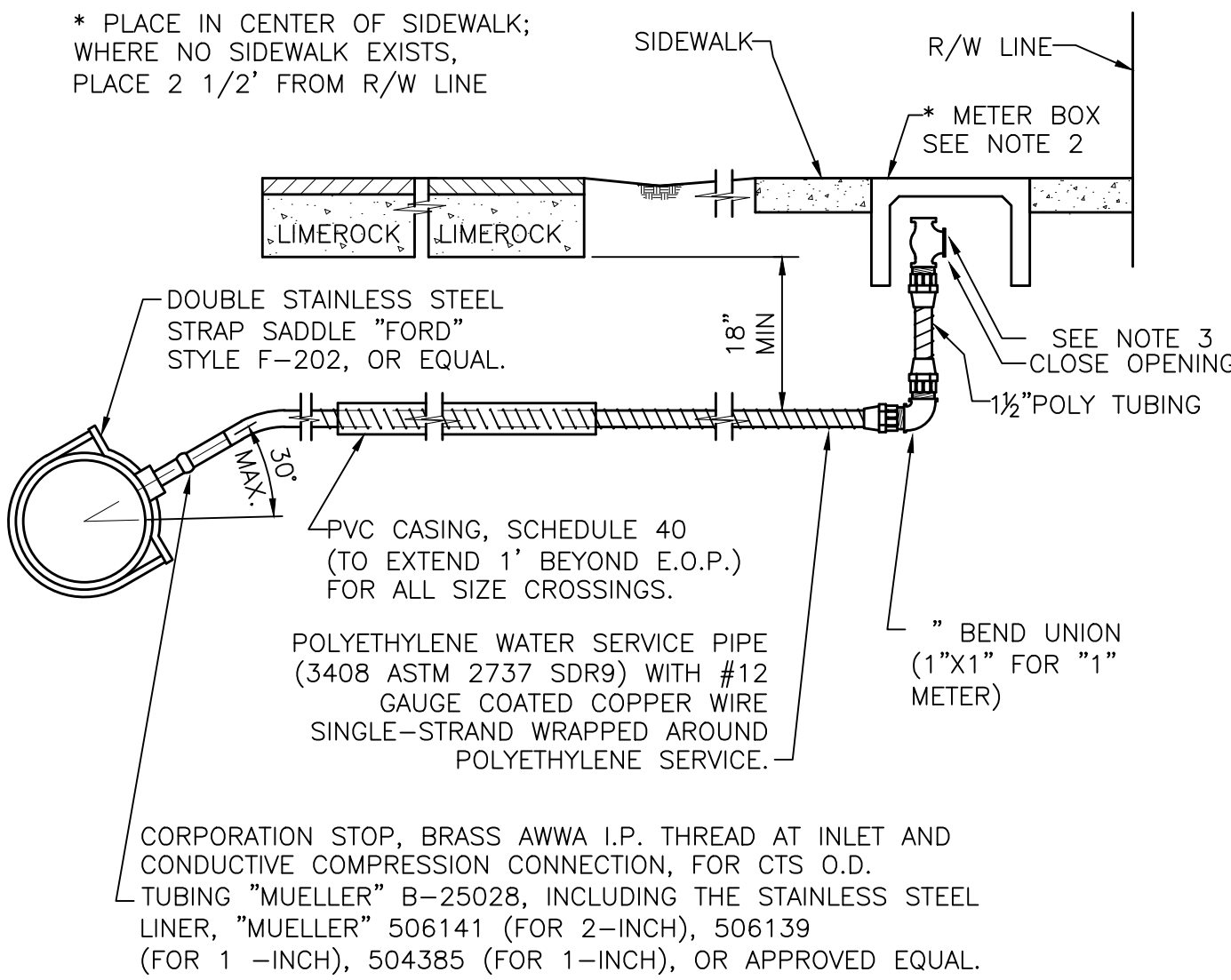
- NOTES:**
1. INSIDE DROP TO BE USED WHEN DROP IS GREATER THAN 6 INCHES AND LESS THAN 24 INCHES AND/OR FOR LATERAL CONNECTIONS.
 2. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
 3. CONSTRUCTION OF DROP SHALL PROVIDE AN OVERSIZED SLAB TO EXTEND UNDER THE DROP CONNECTION.
 4. MINIMUM PIPE SIZE FOR DROP IS 8".
 5. SEE "STANDARD MANHOLE" DETAIL FOR ADDITIONAL REQUIREMENTS.

[illegible]

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
SEWER DETAILS
900 AVOCADO ISLE

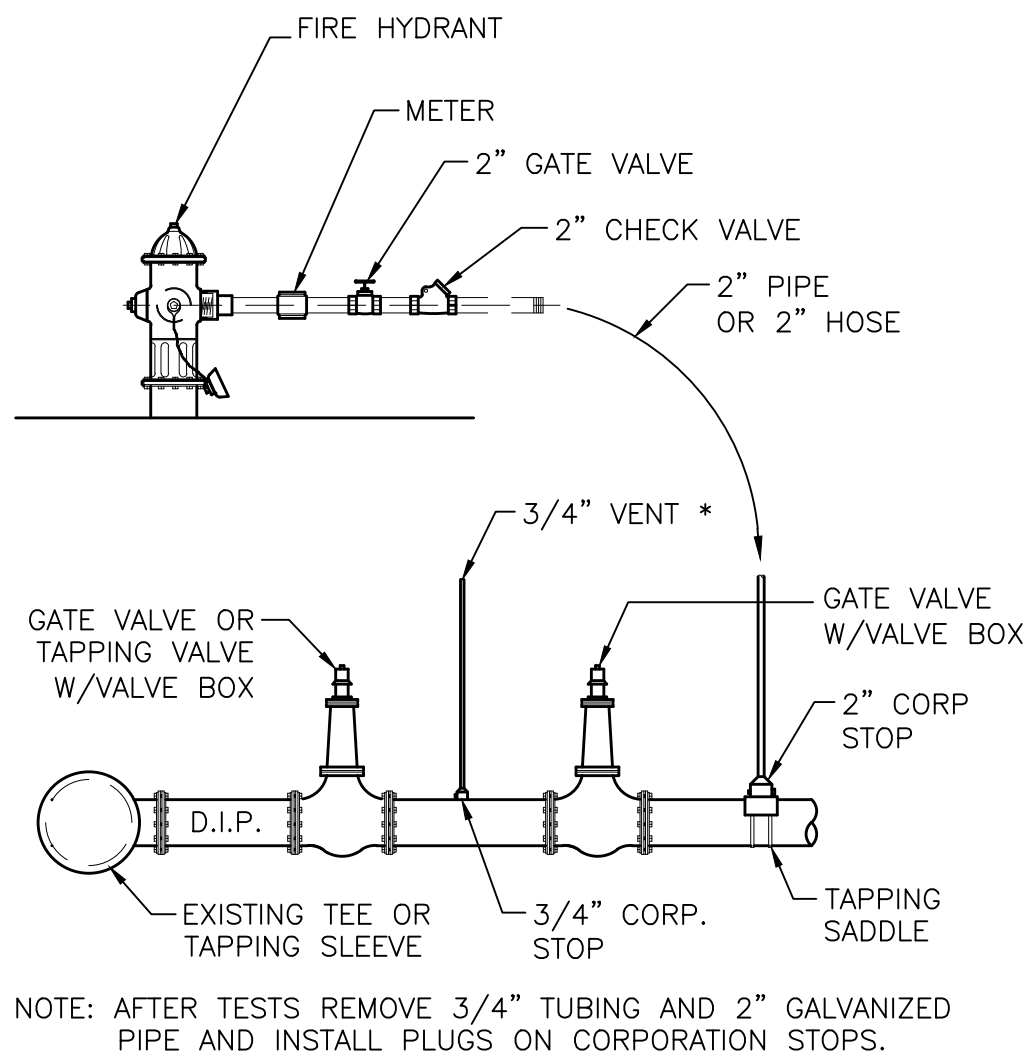
SHEET NO.	OF
C-12	15
TOTAL:	31
CAD FILE:	
11880-C12-DET1	
DRAWING FILE NO.	
4-138761-24	

Page 641 of 663

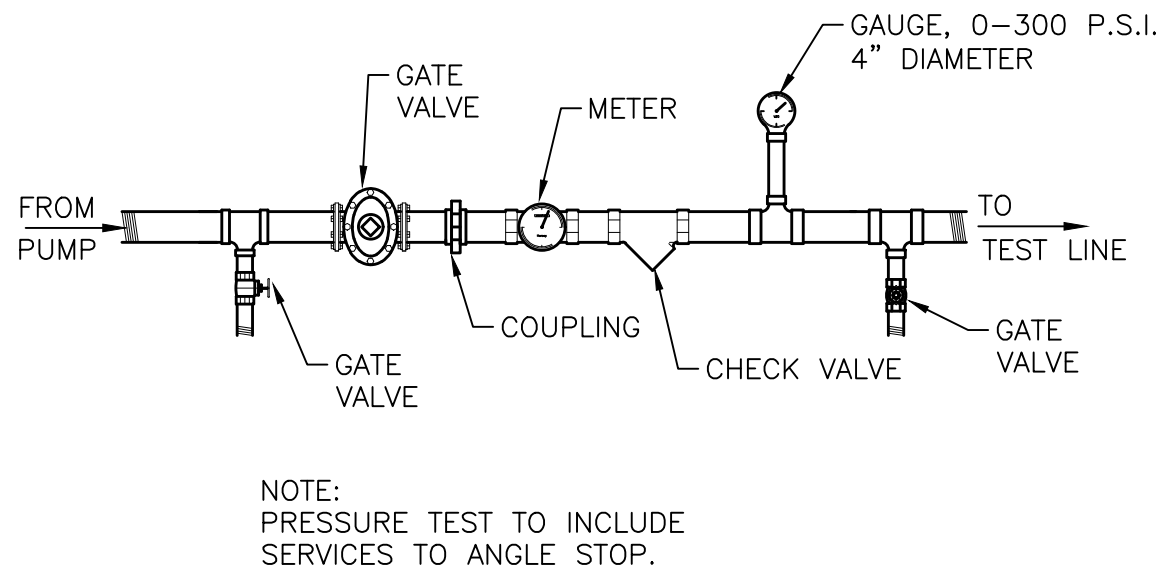


- NOTE:
1. GROUND KEY ANGLE METER STOP, CONDUCTIVE COMPRESSION FOR CTS O.D. TUBING, X METER FLANGE 180° TURN CHECK-LOCK WING "MUELLER" H-14277, FOR 2-INCH INCLUDING THE STAINLESS STEEL LINER, "MUELLER" 506141 (FOR 2-INCH) OR APPROVED EQUAL, AND MUELLER 110 COMPRESSION CONNECTION.
 2. METER BOXES FOR 5/8, 3/4, AND 1 INCH METERS SHALL BE THE OKIE DOKIE #890-40-260282 MEDIUM BOX AND 890-40-260257 MEDIUM LID OR EQUAL.
 3. CONNECT ANGLE VALVE TO EXISTING METER WHERE APPLICABLE.

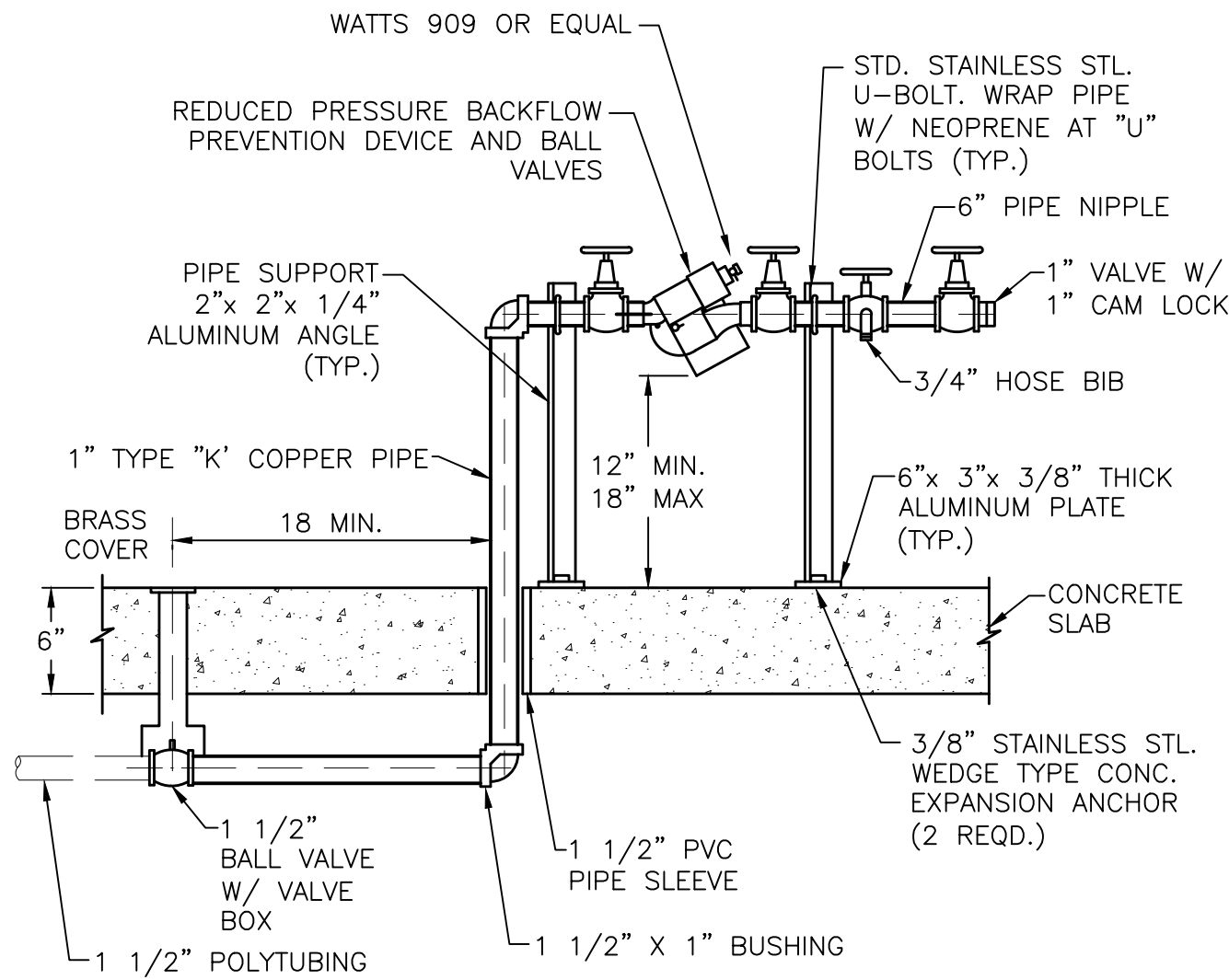
TYPICAL WATER SERVICE INSTALLATION 300



FILLING CONNECTION 305



PRESSURE TEST DETAIL 306



REDUCED PRESSURE BACKFLOW PREVENTER WITH HOSE CONNECTION FOR LIFT STATION 307

FLA. P.E. NO.
51915
STAN EDWARDS

DRAWN BY:	ENG	DATE:	JULY 2016
DESIGNED BY:	WW2011	SCALE:	N.T.S.
CHECKED BY:	WW2011		
FIELD BOOK:			

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE

100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D
1	6/06	RC	W.S.

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
WATER MAIN DETAILS
900 AVOCADO ISLE

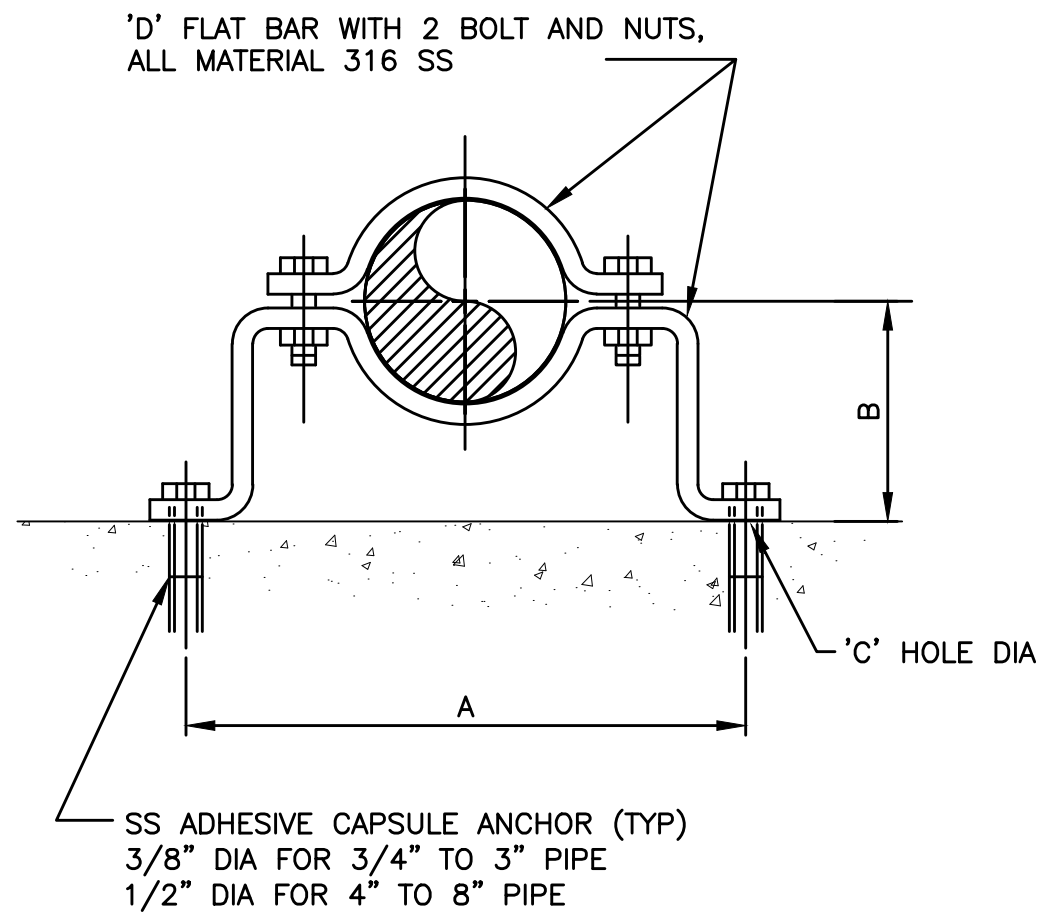
SHEET NO.	OF
C-13	15
TOTAL:	31
CAD FILE:	11880-C13-DET
DRAWING FILE NO.	4-13-14-24

WATER MAIN DETAILS

BID SET

DIMENSIONS IN INCHES					
PIPE DIA.	'A'	'B' SEE NOTE 3 BELOW	'C' HOLE DIA.	'D' FLAT BAR SIZE	LOAD RATING LBS.*
3/4	5-15/16	2-1/2	7/16	3/16 X 1-1/4	300
1	6-1/4	2-5/8	7/16	3/16 X 1-1/4	300
1-1/4	6-11/16	2-3/4	7/16	3/16 X 1-1/4	300
1-1/2	6-15/16	3	7/16	3/16 X 1-1/4	300
2	8-5/16	3-3/16	7/16	1/4 X 1-1/4	500
2-1/2	8-7/8	3-7/16	7/16	1/4 X 1-1/4	500
3	9-1/8	3-3/4	7/16	1/4 X 1-1/4	500
3-1/2	10-1/16	4	7/16	1/4 X 1-1/4	500
4	10-9/16	4-1/4	9/16	1/4 X 1-1/2	600
5	11-3/4	4-3/4	9/16	1/4 X 1-1/2	600
6	14-3/8	5-5/16	9/16	3/8 X 1-1/2	850
8	16-5/8	6-5/16	9/16	3/8 X 1-1/2	850

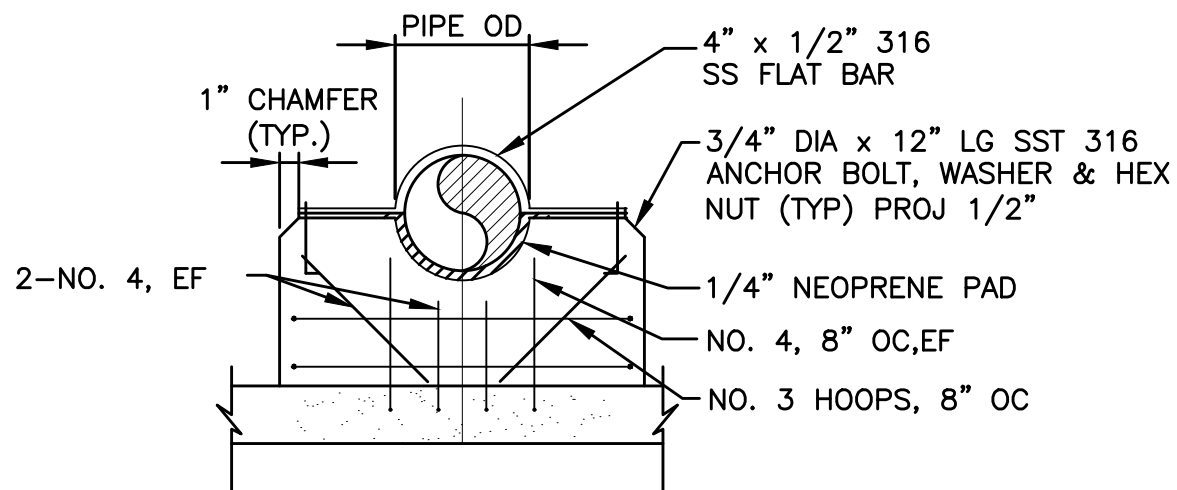
* SAFETY FACTOR OF 5



NOTES:

- WHERE SUBMERGED OR LOCATED ON OR ABOVE TOP OF WALL OF HYDRAULIC STRUCTURE, PIPE CLAMP, WASHER AND SHIELD SHALL BE TYPE 316 STAINLESS STEEL
- WHEN USED WITH PVC OR FIBERGLASS PIPE PROVIDE GALVANIZE STEEL SHIELD AROUND PIPE AT CLAMP, WITH LOOSE FIT. WRAP COPPER TUBES WITH 2\"/>
- FOR FLANGED PIPING INCREASE 'B' DIMENSION AS REQUIRED
- ALL ANCHOR BOLTS SHALL BE TYPE 316 SS.

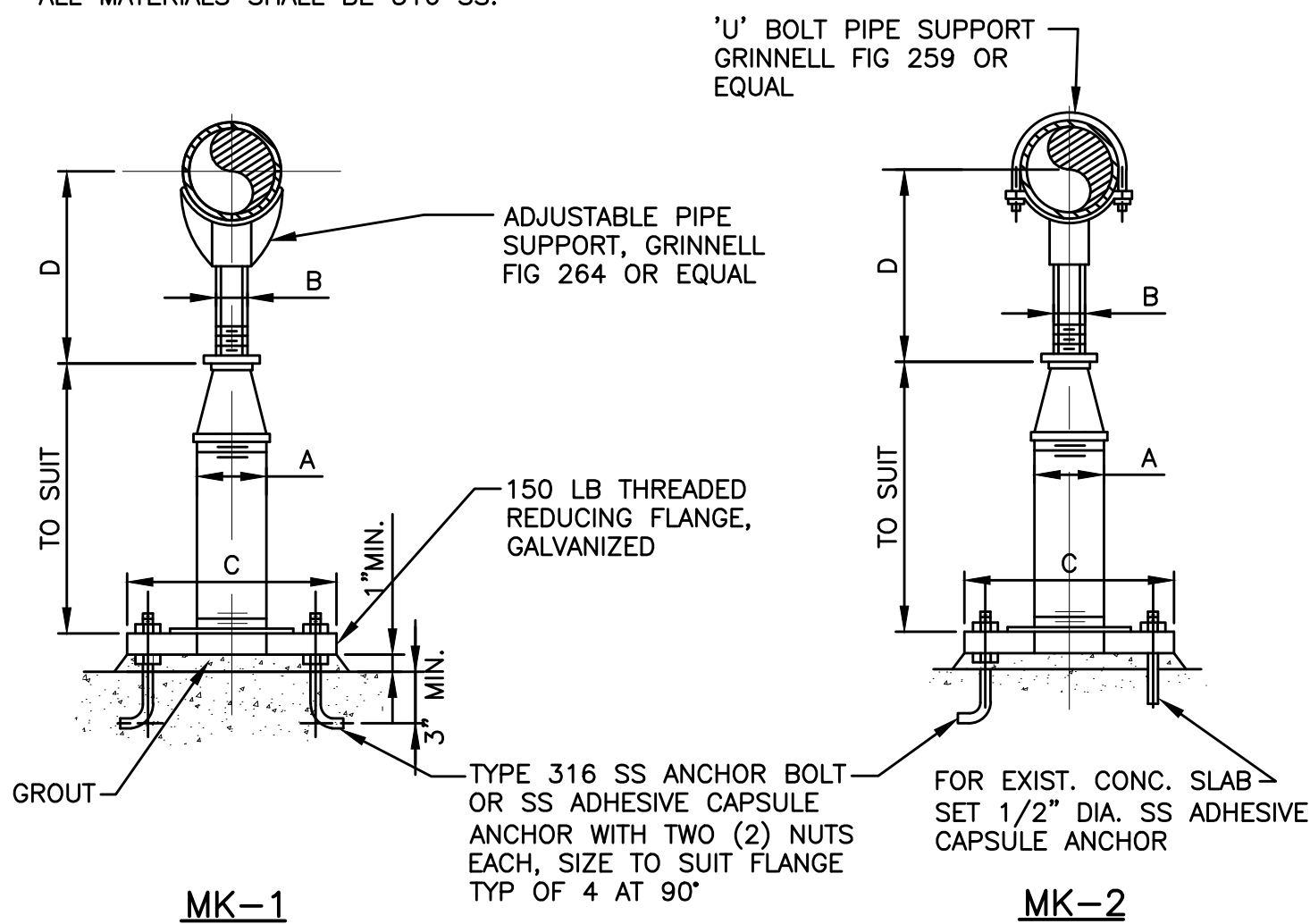
PIPE CLAMP FOR INDIVIDUAL PIPES 937



REACTION TYPE PIPE SUPPORT 944

NOTE:

ALL MATERIALS SHALL BE 316 SS.



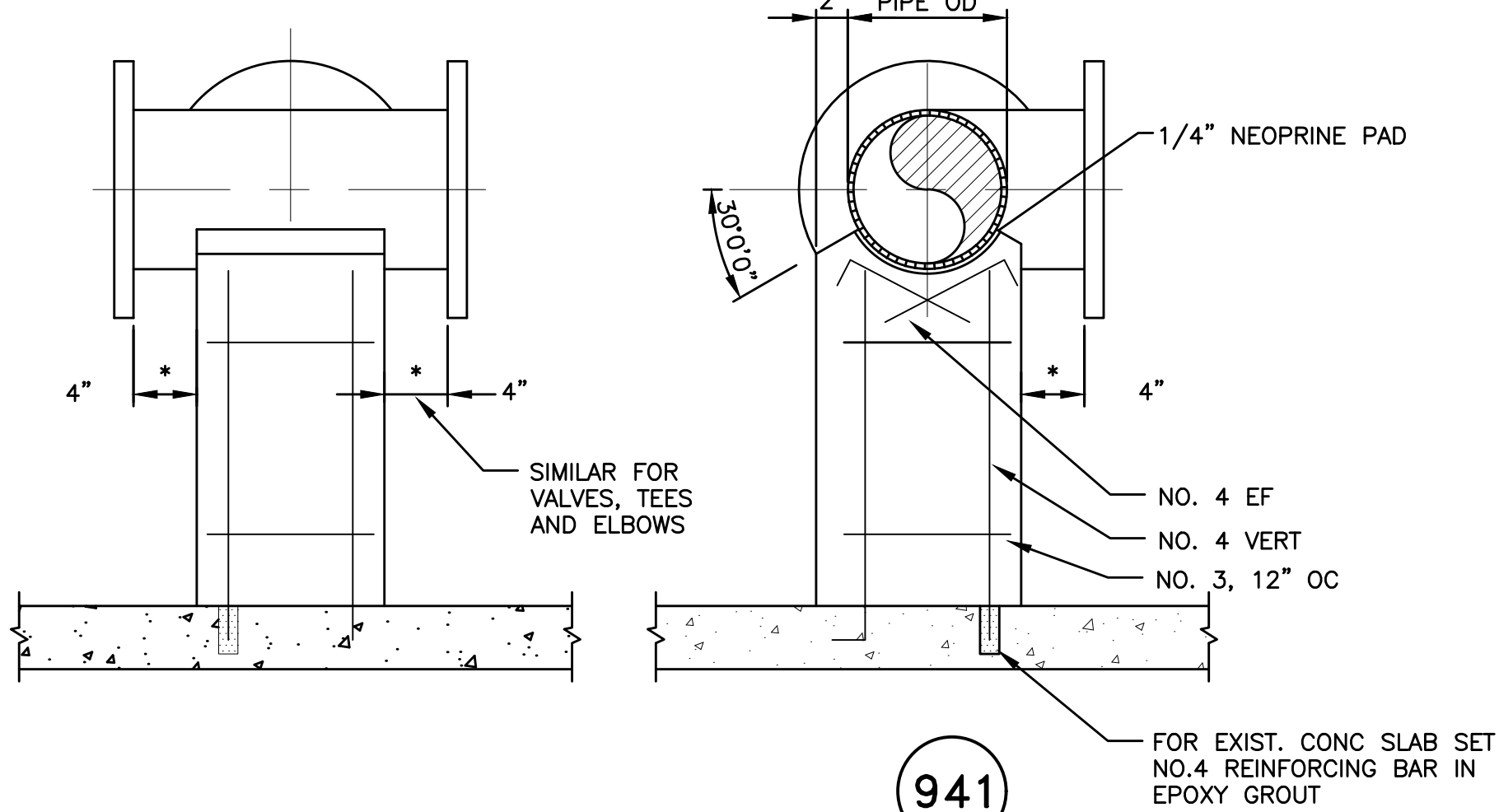
ADJUSTABLE PIPE SUPPORT 938

ADJUSTABLE PIPE SUPPORT APPROX DIMENSIONS IN INCHES					
PIPE SIZE	A	B	C	D MIN	D MAX
2 1/2	2 1/2	1 1/2	9	8	11 1/2
3	2 1/2	1 1/2	9	8 1/4	11 3/4
3 1/2	2 1/2	1 1/2	9	8 1/2	12
4	3	2 1/2	9	10 1/4	14
6	3	2 1/2	9	11 5/8	15 1/4
8	3	2 1/2	9	13 5/8	16 1/2
10	3	2 1/2	9	14 5/8	18 1/4
12	3	2 1/2	9	15 5/8	19 3/4
14	4	3	11	18 5/8	20 3/4
16	4	3	11	19 7/8	22 1/4
18	6	3 1/2	13 1/2	21 1/4	24
20	6	3 1/2	13 1/2	23 1/4	25 1/2
24	6	4	13 1/2	26 1/2	28 1/4
30	6	4	13 1/2	29 5/8	31 1/2
32	6	4	13 1/2	30 5/8	32 3/4
36	6	4	13 1/2	32 5/8	34 3/4

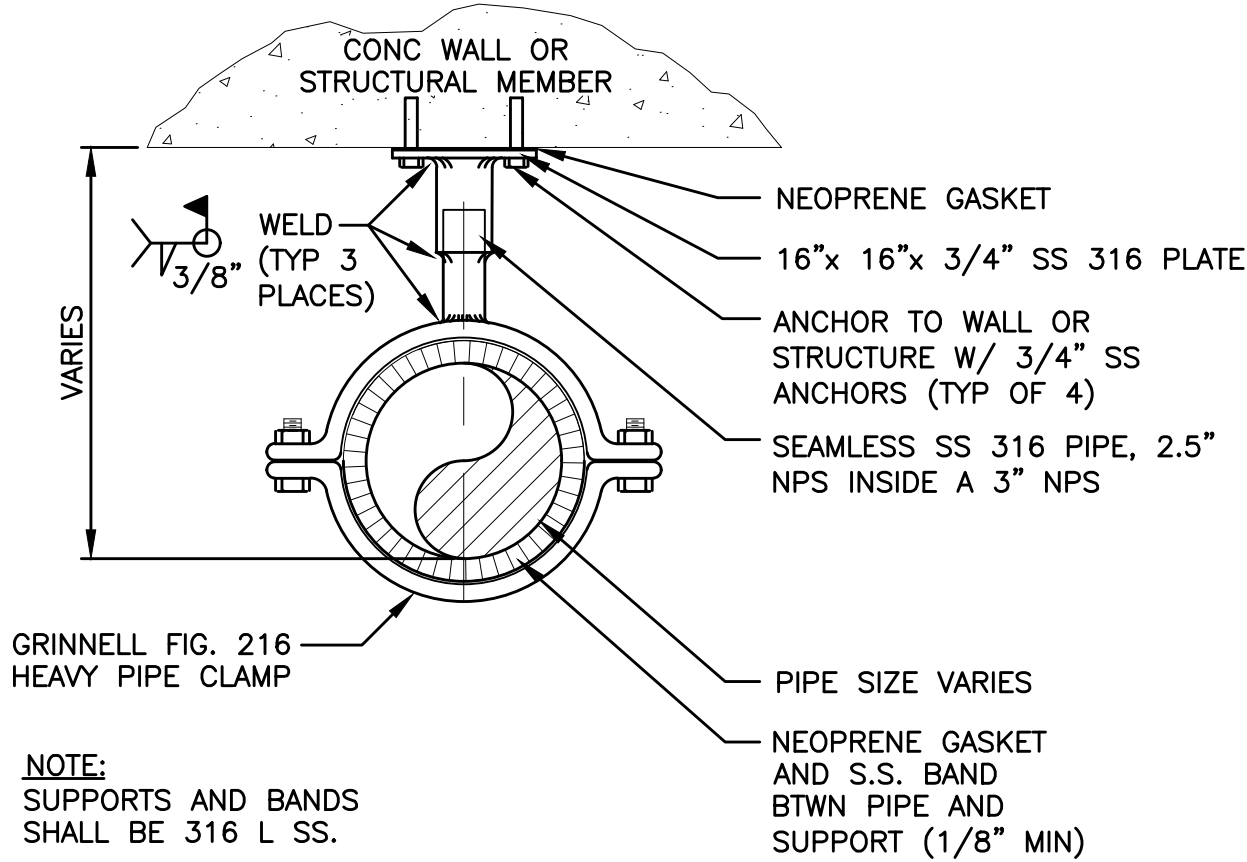
NOTE:

- UNDER VALVES, METERS OR OTHER SPECIAL APPURTENANCES A FABRICATED SUPPORT PIECE MAY BE UTILIZED AS ACCEPTABLE TO ENGINEER

* INCREASE 4\"/>



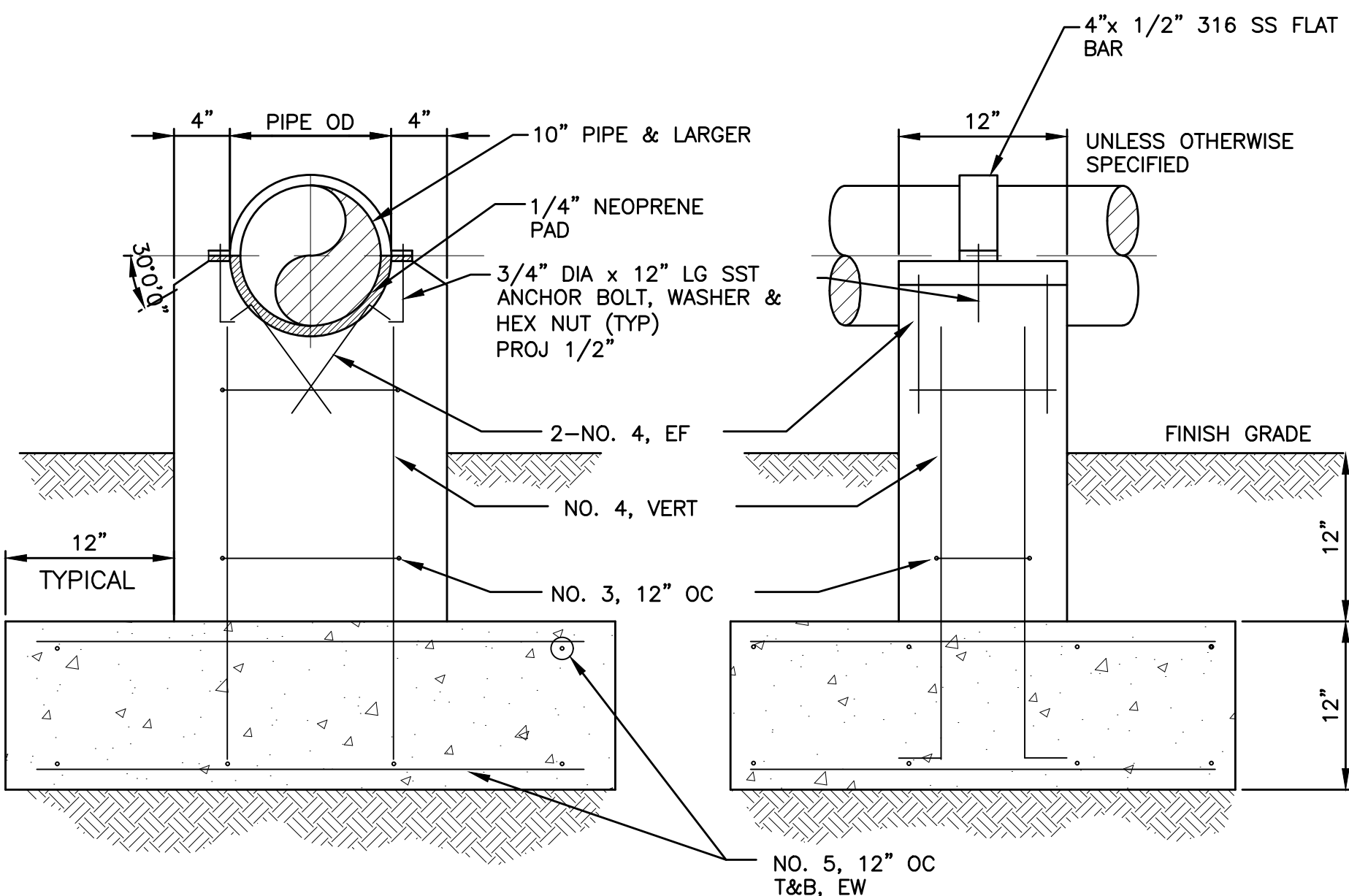
8\"/>



GRINNELL FIG. 216
HEAVY PIPE CLAMP

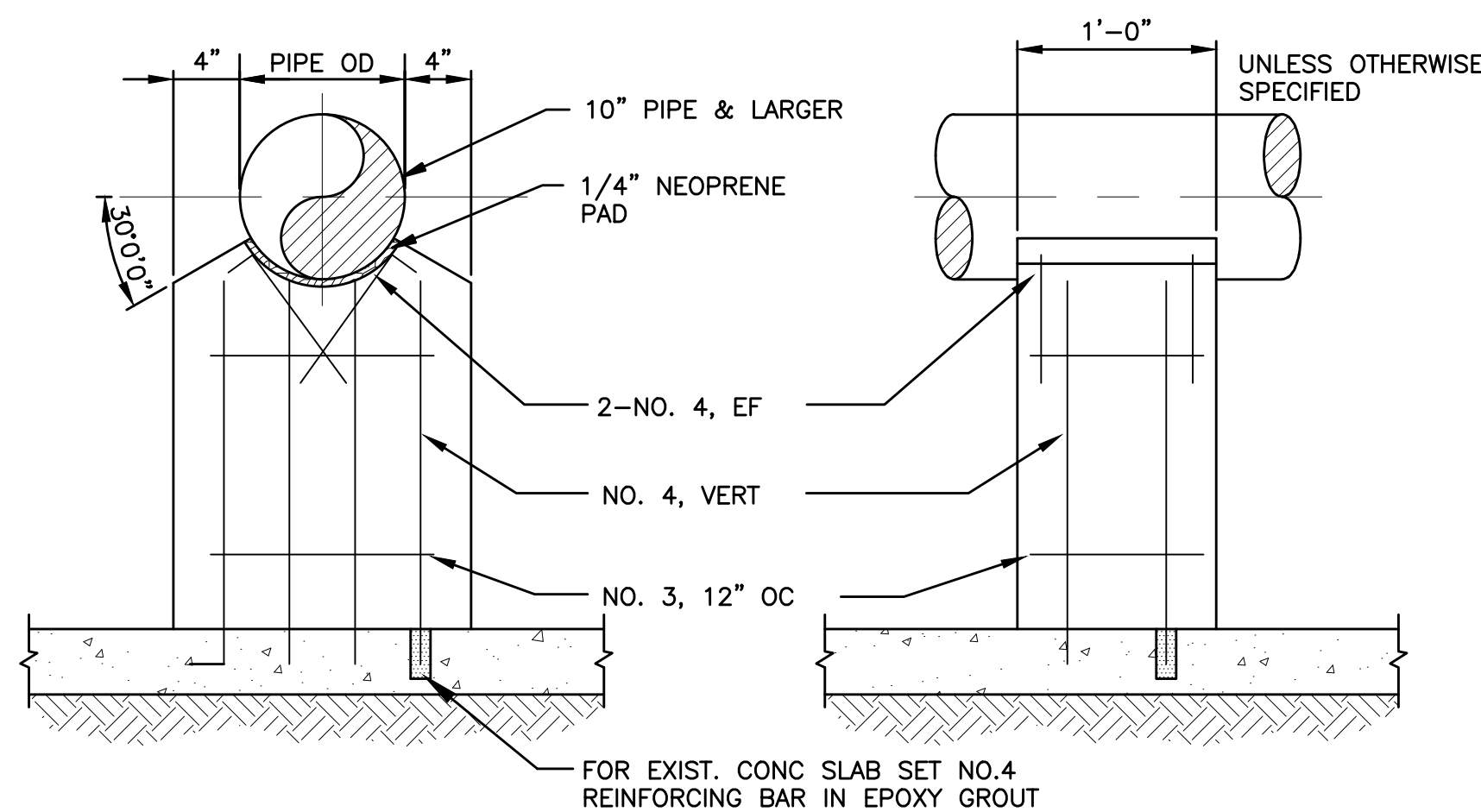
NOTE:
SUPPORTS AND BANDS
SHALL BE 316 L SS.

945



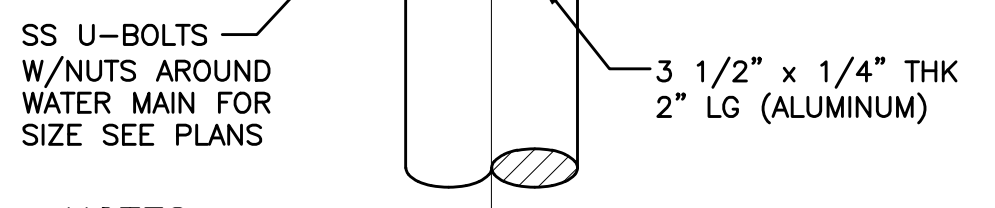
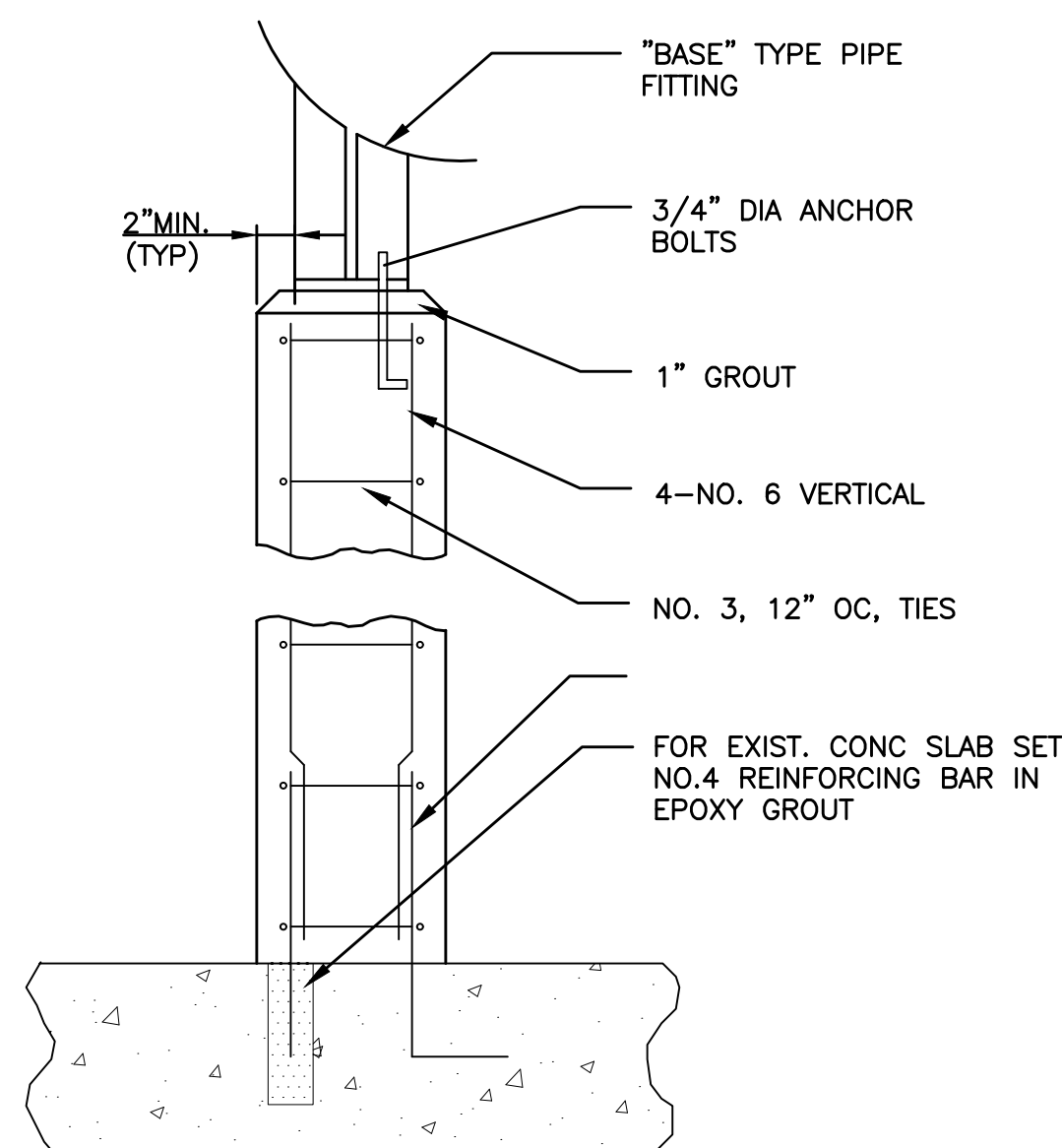
10\"/>

946



10\"/>

939



NOTES

- USE WASHERS WITH NUTS AND BOLTS.
- ALL ANCHORS, FASTENERS, BOLTS, NUTS, WASHERS, SCREWS, ETC. SHALL BE 316 STAINLESS STEEL.
- DETAILS SHOWN ARE INTENDED TO COVER A WIDE RANGE OF PROJECT SITUATIONS. ALL DETAILS MAY NOT APPLY TO THIS PROJECT.

947

PIPE SUPPORT DETAILS

FLA. P.E. NO.
51915
STAN EDWARDS

DRAWN BY: DATE: JULY 2016
LMO

DESIGNED BY: SCALE: NTS
LMO/SE

CHECKED BY: SE
FIELD BOOK:

CITY OF FORT LAUDERDALE

PUBLIC WORKS DEPARTMENT

ENGINEERING & ARCHITECTURE

100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

DESCRIPTION

NO.

DATE

BY

CHECKED

PROJECT # 11880

PUMP STATION REHAB

SANITARY SEWER PUMP STATION A-12

PIPE SUPPORT DETAILS

900 AVOCADO ISLE

SHEET NO.

OF

C-14

15

TOTAL:

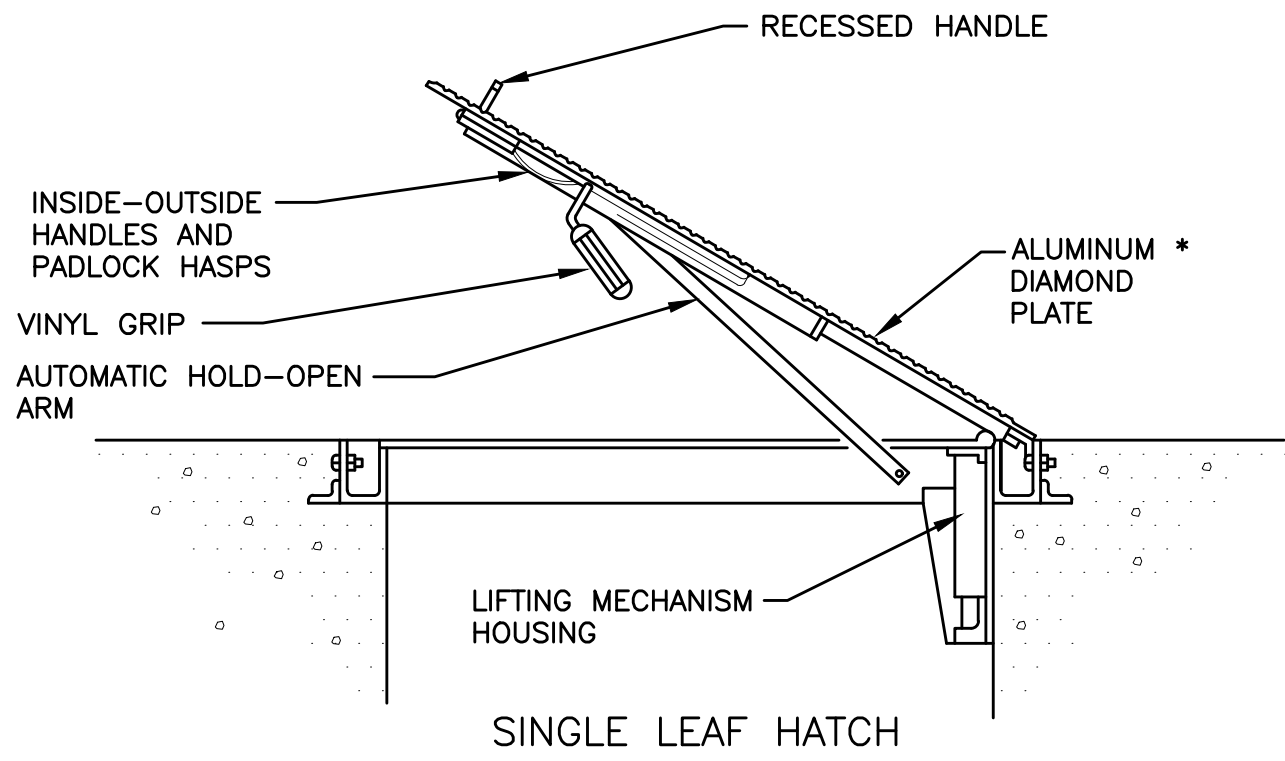
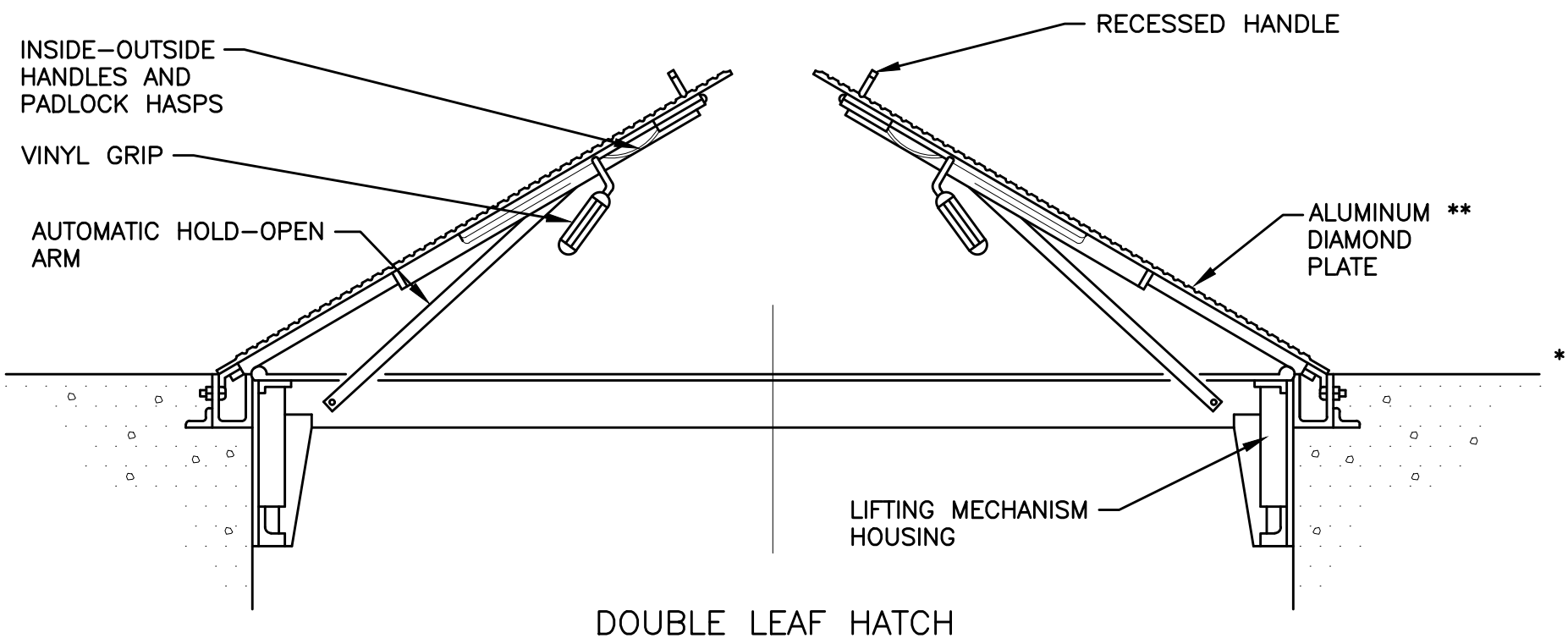
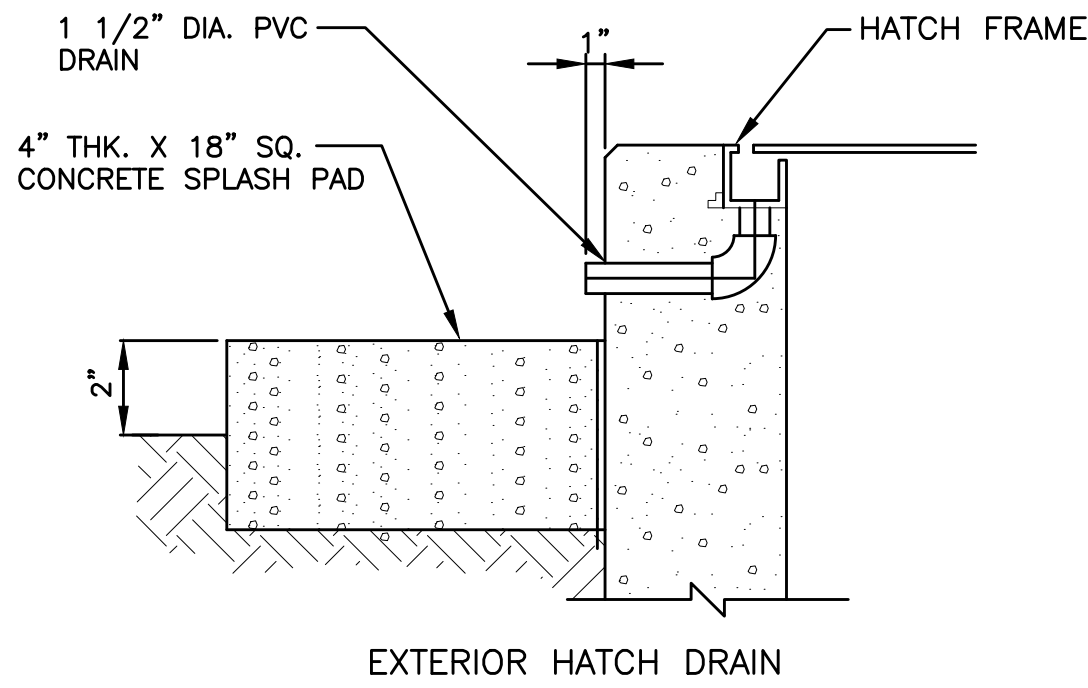
31

CAD FILE:

11880-C14-DET

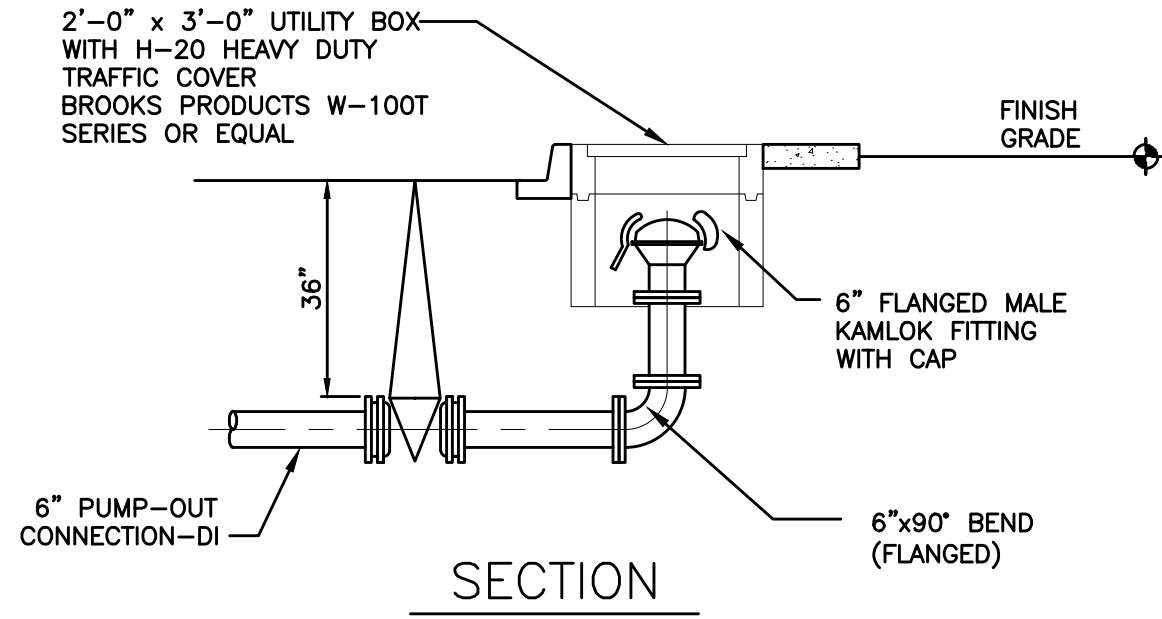
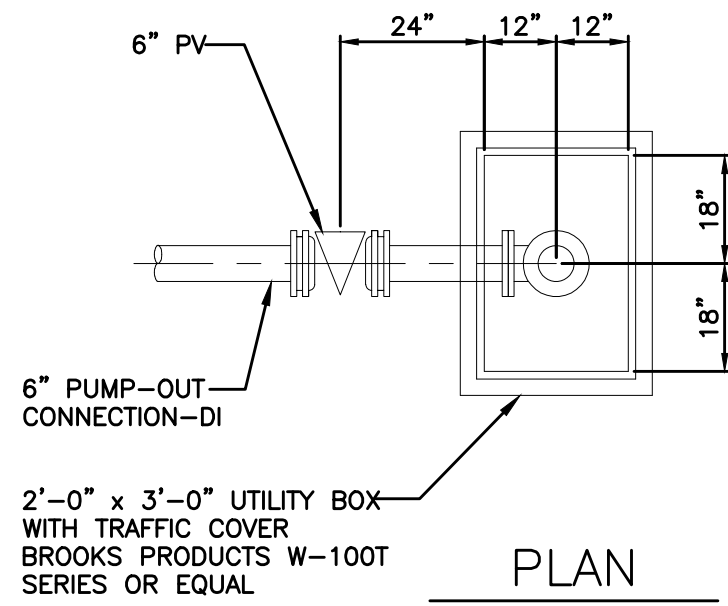
DRAWING FILE NO.

4-131424



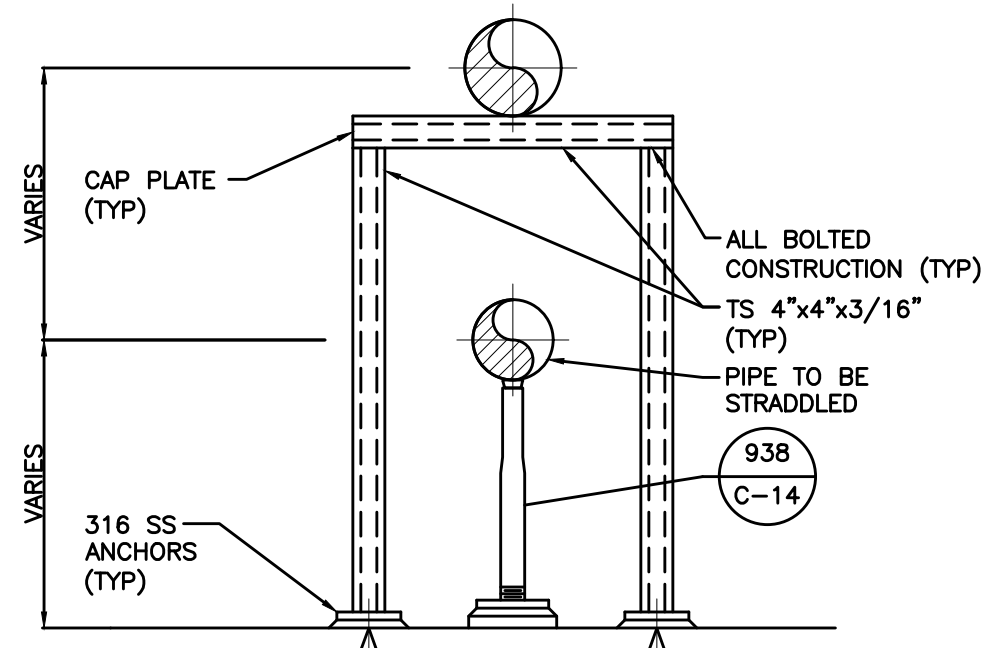
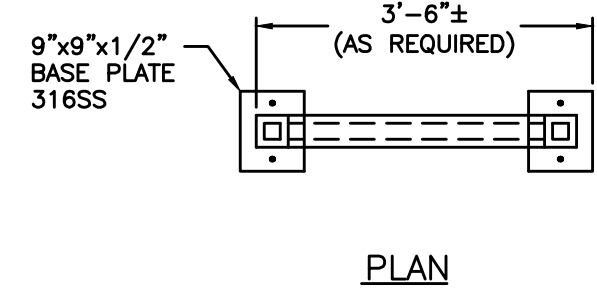
HATCH NOTES

1. ALUMINUM HATCHES TO BE SUPPLIED WITH STAINLESS STEEL HARDWARE.
2. ALL HATCHES TO BE SUPPLIED WITH SAFETY CHAINS. CORNER POST WITH FLOOR INSERTS MUST ALSO BE PROVIDED FOR SINGLE LEAF HATCHES.
- * DIMENSIONS TO BE CONFIRMED WITH PUMP MANUFACTURERS SHOP DRAWINGS.
- * ALL HATCHES SHALL BE ALUMINUM CONSTRUCTION HEAVY DUTY (H-20) LOADING UNLESS OTHERWISE NOTED.
3. CONCRETE REPAIR TO STATION ENTRANCE OPENING/AREA SHALL BE PER REPAIR DETAIL, SHEET C-17.
4. PRICING FOR CONCRETE REPAIR AT STATION ENTRANCE SHALL NOT INCLUDE NEW ENTRY HATCH(S) AND NEW AIR INTAKE SCREEN. SUCH SHALL BE INCLUDED IN CONTRACTOR'S BASE PRICING FOR STATION REHAB.



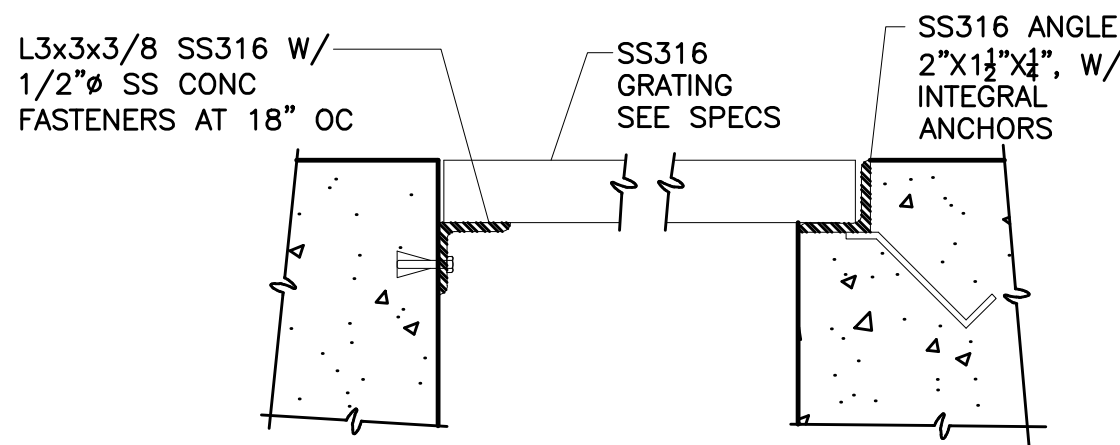
EMERGENCY PUMP OUT

DETAIL A
3/8" = 1'-0"



NOTES:
PROVIDE SHOP DWG

CHANNEL PIPE SUPPORT B
M-1

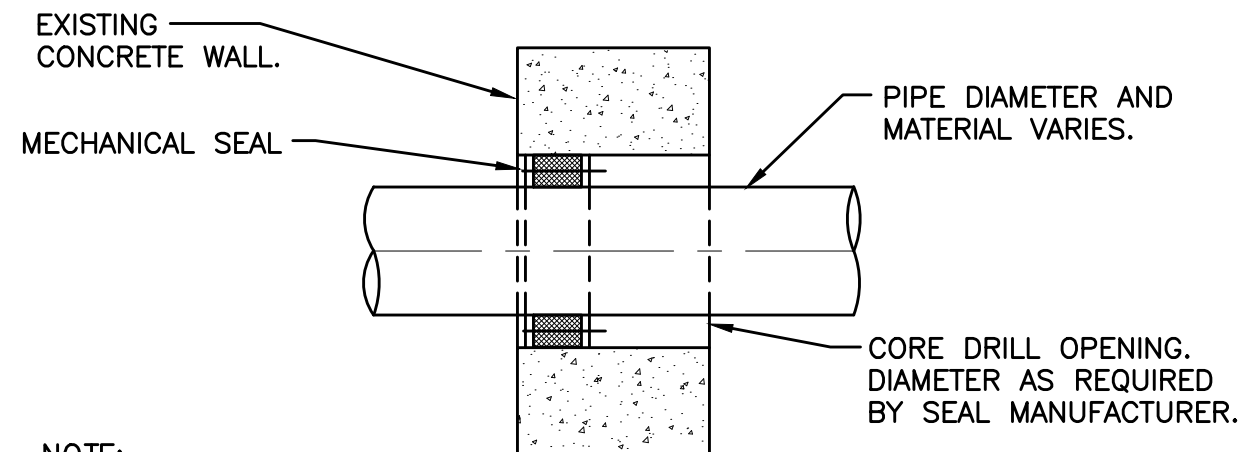


MAXIMUM SPAN	DEPTH	BEARING BAR	
		THICKNESS	SPACING
3'-0"	1 1/4"	3/16"	1 3/16"
4'-0"	1 1/2"	3/16"	1 3/16"
5'-0"	2"	3/16"	1 3/16"
6'-0"	2 1/4"	3/16"	1 3/16"

- A. AIR INTAKE GRATING, 4'-7"x4' SPAN, APPROX. MAIN MEMBERS SS 316, 1 1/2"x3/8", SPACING 1 3/8" CROSS MEMBERS SS316, 3/8"x3/8", SPACING 4"; EXPANDED MESH, SS316, IN THE SHAPE OF LOZENGES, WITH 1/2" BIGGEST OPENING; TO BE TACK WELDED TO GRATING ON 6" CENTERS IN BOTH DIRECTIONS.
- B. 1ST FLOOR OPENING GRATING, HINGED, 35"x38" SPAN OR LARGER FRAME THE OPENING WITH 3"x3"x1/4" ALUM. ANGLE; HINGED GRATE WITH LOCK FOR OPEN POSITION (NOT SHOWN); MAIN MEMBERS ALUM. 1 1/2"x3/8", SPACING 1 1/2", SUPPORTED Laterally BY CROSS MEMBERS; MISC. METAL WORK AS NEEDED; INTENT IS TO PROVIDE A COMPLETE STURDY GRATING; MATCH EXISTING, OR BETTER; SUBMIT SHOP DRAWINGS

GRATINGS AND GRATING SUPPORTS

DETAIL E
NTS



NOTE:
INSULATED PIPING:
INTERRUPT INSULATION AT BOTH SIDES OF WALL. INSTALL INSULATION FLUSH WITH WALL AFTER WATER TIGHT INSTALLATION OF MECHANICAL SEAL.

CORE DRILLED OPENING AND MECHANICAL SEAL PENETRATION THROUGH EXISTING CONCRETE

DETAIL D
NTS

MISC. DETAILS

FLA. P.E. NO.
51915
STAN EDWARDS

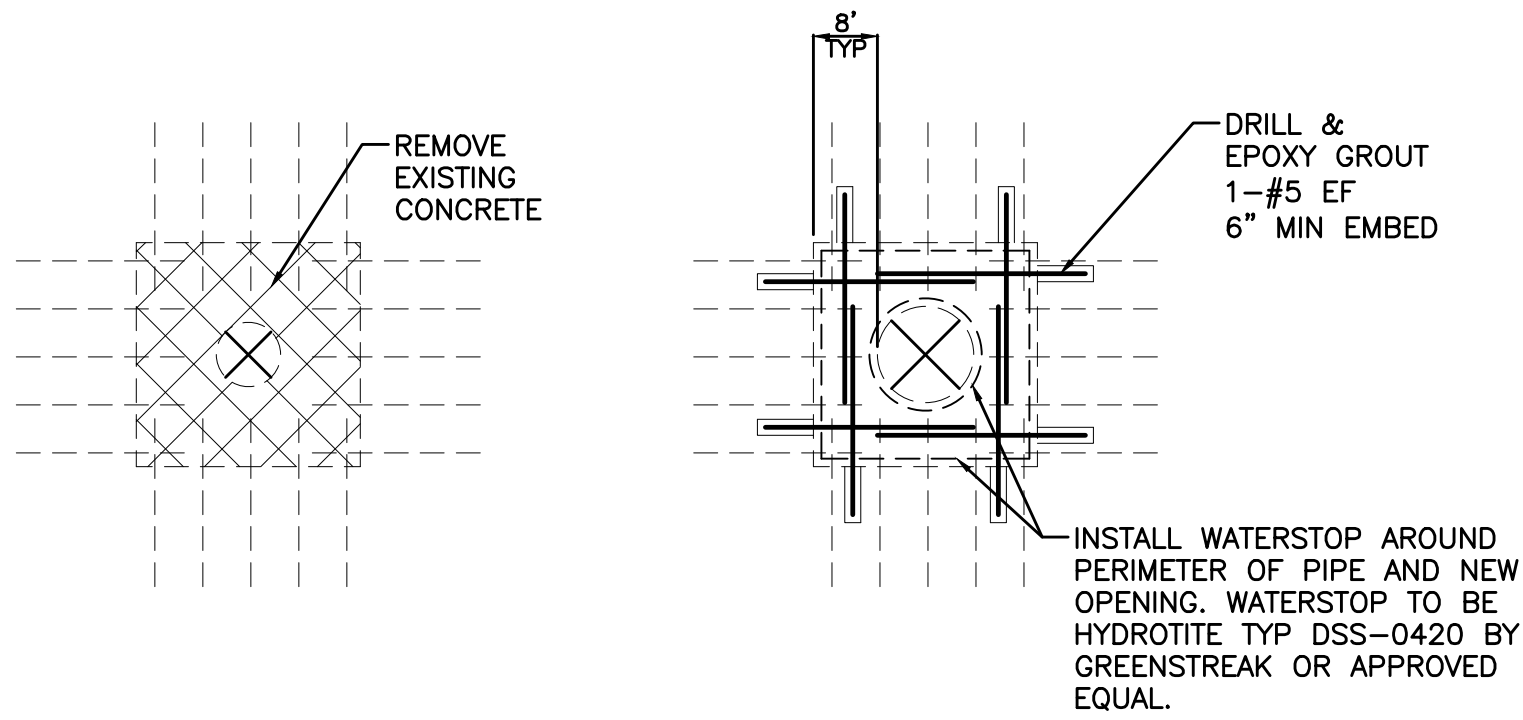
DRAWN BY: LMO
DESIGNED BY: LMO/SE
CHECKED BY: SE
DATE: JULY 2016
SCALE:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D

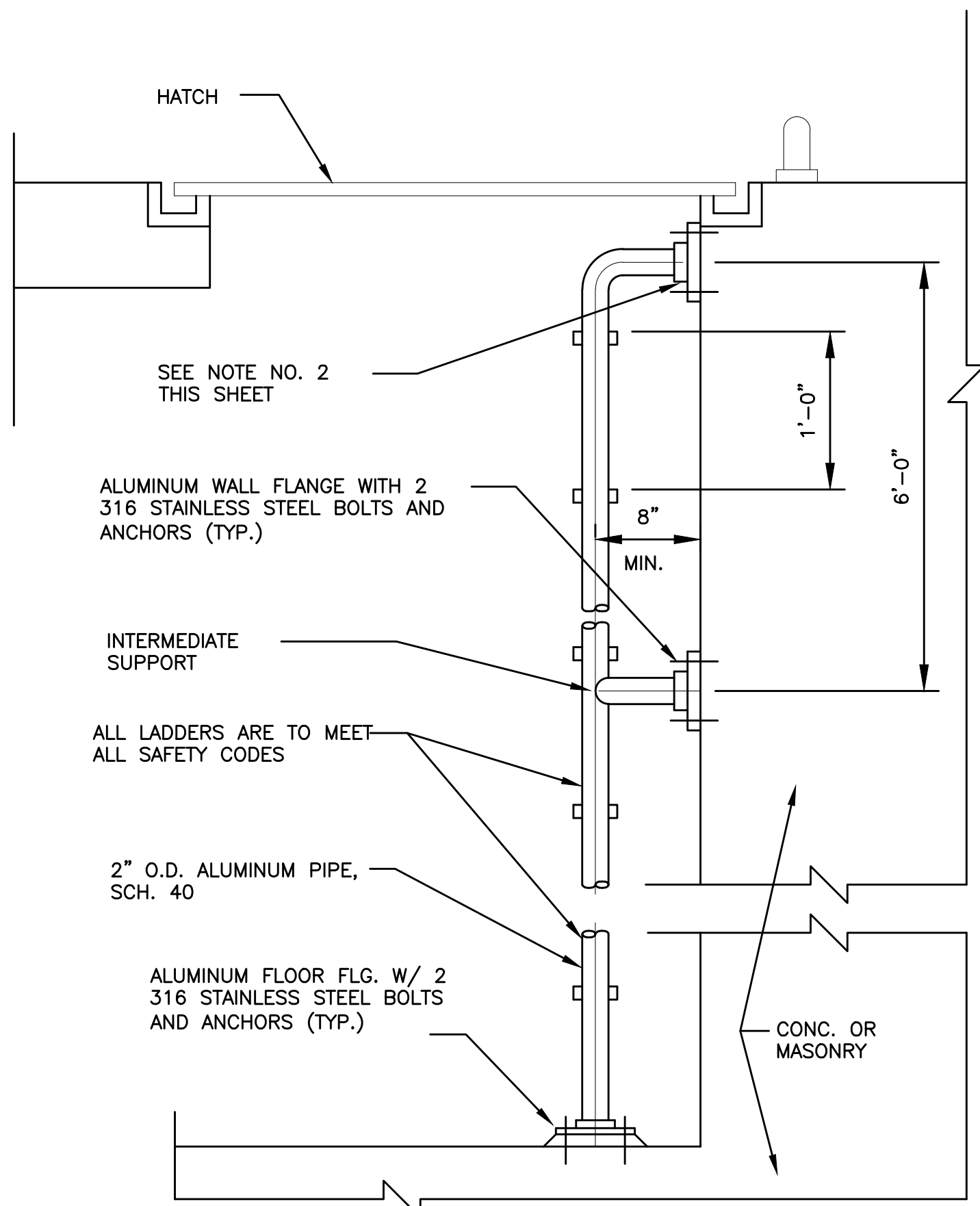
PROJECT # 11880
PUMP STATIONS REHAB
SANITARY SEWER PUMP STATION A-12
PUMP STATION DETAILS
900 AVOCAO ISLE

SHEET NO.	OF
C-15	15
TOTAL:	31
CAD FILE:	11880-C15-DETL
DRAWING FILE NO.	4-1311424



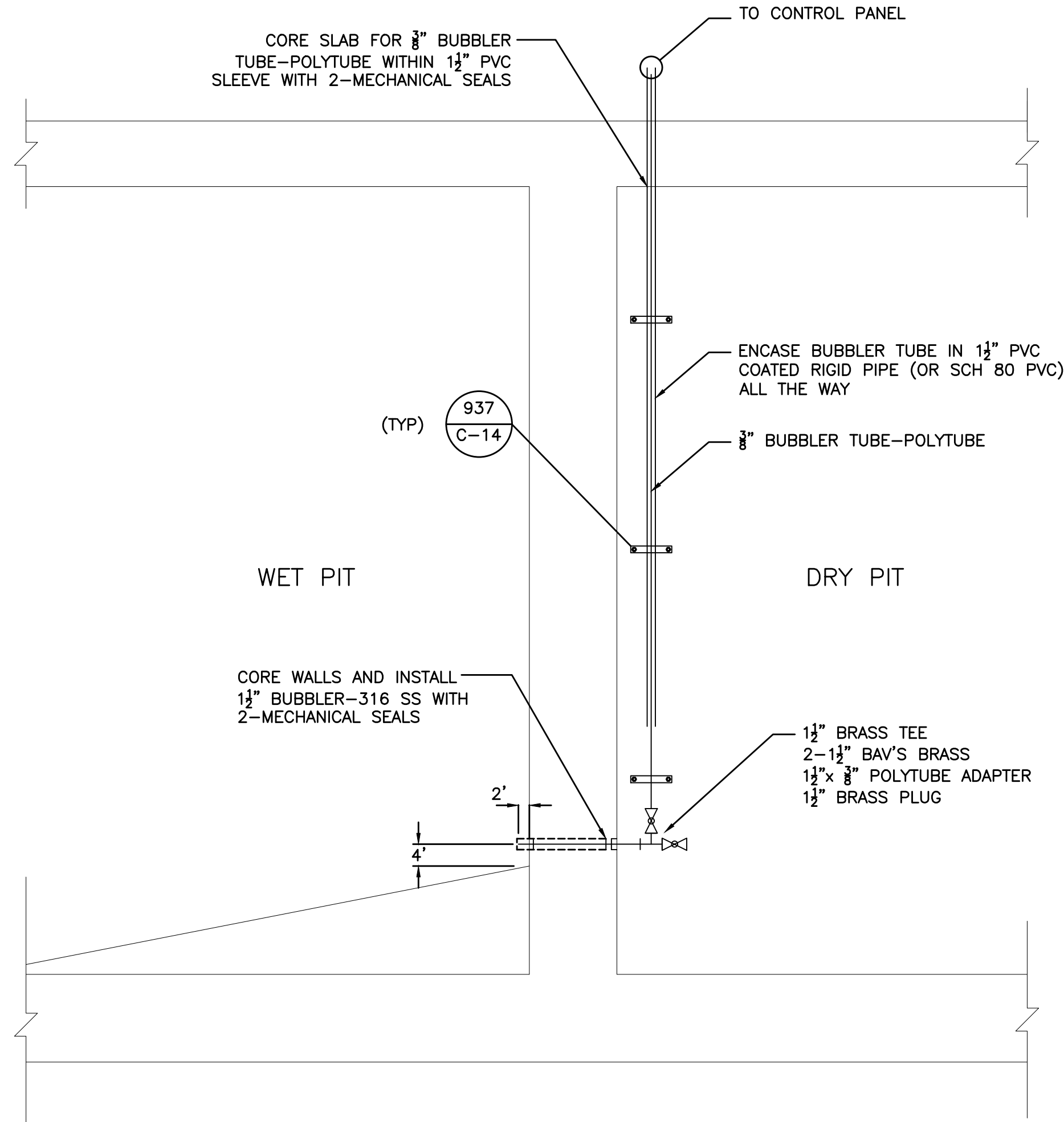
WALL PIPE TO BE INSTALLED IN EXISTING WALL

DETAIL C
1/2" = 1'-0"

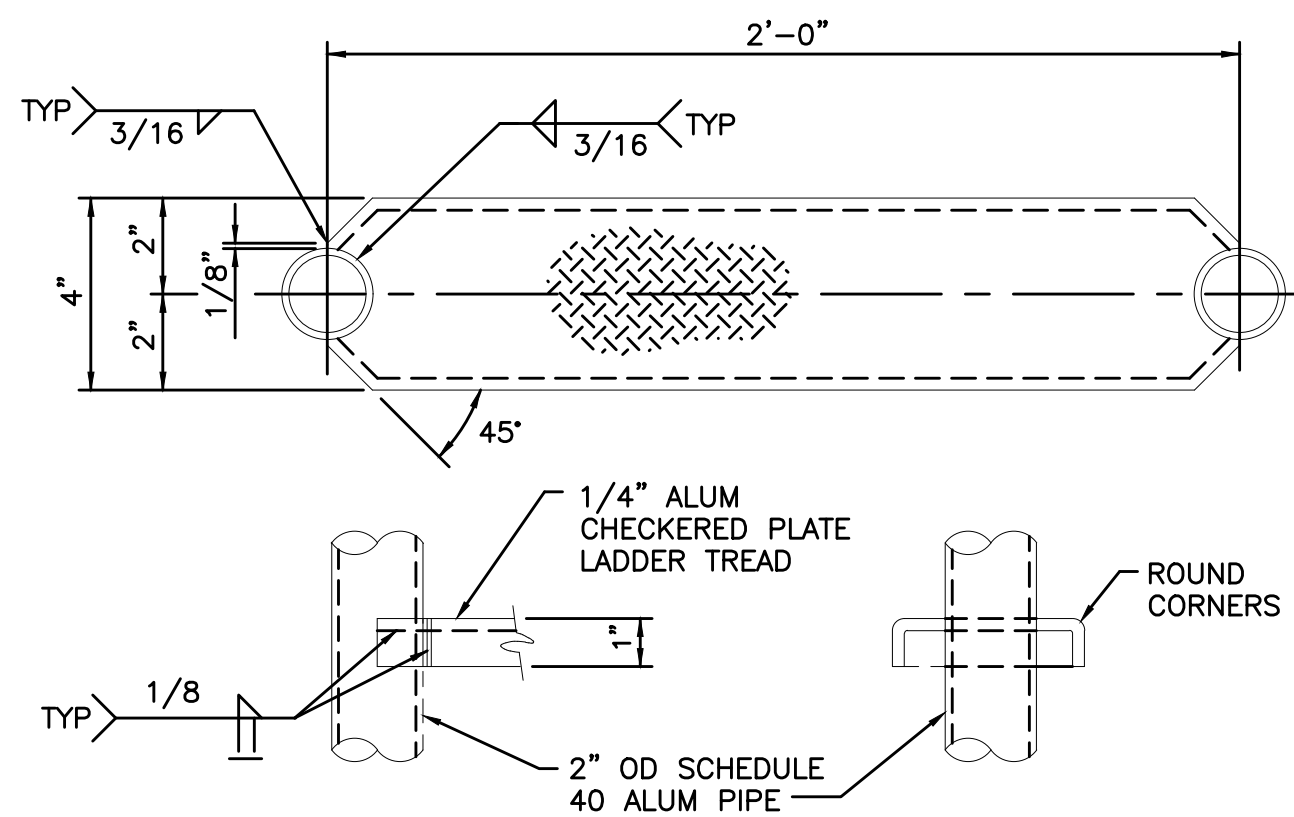


TYPICAL ALUMINUM LADDER (IN PIT)

DETAIL G
1" = 10'



BUBBLER DETAIL H
M-1



ALUMINUM LADDER TREAD

DETAIL F
NTS

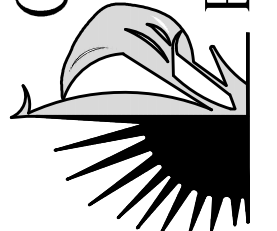
MISC. DETAILS

PLOT DATE: July 8, 2016

FLA. P.E. NO.
51915
STAN EDWARDS

DATE:	JULY 2016
DRAWN BY:	LMO
DESIGNED BY:	SCALE: AS SHOWN
CHECKED BY:	LMO/SE
SE	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE


100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D

PROJECT # 11880
PUMP STATIONS REHAB
SANITARY SEWER PUMP STATION A-12
MISC. DETAILS
900 AVOCADO ISLE

SHEET NO.	OF
C-16	15
TOTAL:	31
CAD FILE:	11880-C16-MULTI
DRAWING FILE NO.	4-1311424

BID SET

GENERAL ELECTRICAL NOTES FOR LIFT STATIONS

1.

CONTRACTOR SHALL PROVIDE NEW UNDERGROUND SERVICE FROM UTILITY CONNECTION POINT TO METER BASE LOCATION. CONTRACTOR SHALL COORDINATE WITH THE POWER UTILITY IN ORDER TO PROVIDE BALANCED THREE PHASE POWER AS PER PLAN TO LIFT STATION. CONTRACTOR SHALL COORDINATE WITH OWNER AND CONTRACTOR TO INCLUDE ALL REQUIRED MATERIAL AND LABOR INCLUDING METER BASE AND ANY UTILITY FEE, WHICH MAY BE REQUIRED BY THE LOCAL UTILITY FOR INSTALLATION OF THE NEW SERVICE OR INCREASE IN CURRENT SERVICE. THE CONTRACTOR SHALL INCLUDE A MINIMUM OF 100 FEET OF UNDERGROUND SERVICE FROM METER BASE TO THE FPL SERVICE CONNECTION POINT IN THE BASE BID FOR EACH STATION.
2.

DUE TO THE EXISTENCE OF METHANE GAS INSIDE OF THE WET WELL AND VALVE BOX, ALL SPACES 18" (INCHES) ABOVE THE WET WELL TOP SLAB PASSING 3' (FEET) FROM SLAB BOUNDARY, AND 3' (FEET) FROM VENT OPENING IN ALL DIRECTIONS ARE CONSIDERED TO BE HAZARDOUS UNDER GROUP D (FPN #8). ACCORDING TO ARTICLE 500 HAZARDOUS CLASSIFIED LOCATION SECTION 500-5 (e), LIFT STATION FALL UNDER CLASS I, DIVISION I LOCATION.
3.

PER NEC 501-3-(a) IN CLASS DIVISION LOCATIONS, METERS, INSTRUMENTS, AND RELAYS, INCLUDING KILOWATT HOUR METERS, INSTRUMENT TRANSFORMER, RESISTORS, AND RECTIFIERS SHALL BE PROVIDED WITH ENCLOSURES APPROVED FOR CLASS I, DIVISION I LOCATIONS. EXPLOSION PROOF, PURGED AND PRESSURIZED ENCLOSURES ARE APPROVED FOR CLASS I DIVISION I.
4.

PER NEC 501-4, IN CLASS I, DIVISION I LOCATION, GLUED SCH 80 PVC CONDUITS, OR THREADED RIGID AND INTERMEDIATE METAL CONDUITS, OR TYPE MI CABLE WITH TERMINATION FITTINGS APPROVED FOR THE LOCATION SHALL BE THE WIRING METHOD EMPLOYED.
5.

PER NEC 501-5 IN CLASS I, DIVISION I LOCATIONS, IN EACH CONDUIT RUN ENTERING AN ENCLOSURE OF SWITCHES OR CIRCUIT BREAKER ETC.,SEAL SHALL BE INSTALLED WITHIN 18" FROM SUCH ENCLOSURE. FOR DETAIL OF ALL APPROVED MATERIALS AND INSTALLATION SEE ARTICLE 501 OF NATIONAL ELECTRICAL CODE.
"EYSR" SPLIT CASE FITTING (MANUFACTURED BY CROUSE-HINDS), AND FILL WITH "DUCT SEAL" CEMENT SHOULD BE USED. IF PVC COATED CONDUITS ARE USED PEEL OFF THE SECTION WHERE THE SPLIT SEAL GOES, AND AFTER IT HAS BEEN INSTALLED COAT THE OUTSIDE OF THE CONDUIT WITH MANUFACTURES RECOMMENDATION KIT.
6.

INCASE THE CONTROL PANEL SERVICE DISCONNECT ENCLOSURE ARE INSTALLED STAND-ALONE OUTDOOR, THE TOTAL INSTALLED ASSEMBLY MUST BE ABLE TO WITHSTAND THE WIND LOAD PER LATEST "SOUTH FLORIDA BUILDING CODE". THE CONTRACTOR TO SUBMIT THE SHOP DRAWING OF INSTALLED ASSEMBLY, THAT HAVE THE WIND LOAD CALCULATION AND THE SIGN AND SEAL OF A STATE OF FLORIDA REGISTERED PROFESSIONAL ENGINEER.
7.

ALL CONDUITS SHOULD ENTER THE CONTROL PANEL FROM THE BOTTOM AS MUCH AS POSSIBLE.
8.

THE CONTRACTOR SHALL COORDINATE WITH THE POWER SUPPLY UTILITY IN ORDER TO PROVIDE A BALANCED THREE PHASE POWER WITH THE PROPER VOLTAGE TO LIFT STATION. CONTRACTOR TO INCLUDE ALL REQUIRED MATERIALS, LABOR, AND EQUIPMENT, WHICH MAY BE REQUIRED BY THE LOCAL POWER UTILITY TO INSTALL NEW POWER SERVICE.
9.

CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR AND EQUIPMENT TO INSTALL 100 FEET OF NEW UNDERGROUND SERVICE FROM UTILITY SERVICE BOX TO METER CAN LOCATED AT THE DISTRIBUTION PANEL "DP".
10.

CONTRACTOR TO VERIFY INSTALLATION OF PROPER LIGHTENING ARRESTER, BY FP&L, WHEN SERVICE IS FROM POLE MOUNTED TRANSFORMER AND OVER HEAD LINES.
11.

CONTRACTOR TO PAY ANY UTILITY FEES, EPA PERMIT FEE AND ANY OTHER LICENSING FEE TO EXPEDITE THE CONSTRUCTION PROCESS.
12.

CITY WILL COMPENSATE THE ABOVE FEES TO CONTRACTOR, AS PASS THROUGH, BASED ON ACTUAL RECEIPT WITHOUT ANY MARK UP.
13.

THE LIFT STATION POWER SUPPLY SHALL BE EQUIPPED WITH MANUAL TRANSFER SWITCH WITH MANUAL BY-PASS, TO BE ABLE TO USE EMERGENCY POWER OF GENERATOR.
14.

THE DISTRIBUTION PANEL "DP" SHOULD BE SERVICE RATED 60 KAIC OR HIGHER, WITH NEMA 4X (STAINLESS STEEL 316) HINGED LOCKABLE DOOR(S) CONSTRUCTED PER REQUIREMENT OF MATERIAL APPROVED FOR CLASS I, DIVISION I LOCATION. ALL CONDUITS ENTERING AND CONDUITS LEAVING MUST HAVE STOP SEAL AT DISTANCE OF 18' FROM PANEL.

15.

ALL WIRING TO BE STRANDED COPPER WITH "THHN" INSULATION.
16.

IN LIFT STATION WITH 480V/277V/3φ POWER, A STEP-DOWN TRANSFORMER 480V/208V/120V/3φ, DELTA GROUNDED STAR, MINIMUM NEMA 3R TO BE INSTALLED AT BACK OF "DP" PANEL TO FEED LOW VOLTAGE SUB-PANEL "LDP". THE TRANSFORMER CAPACITY WILL VARY ACCORDING TO THE LOW VOLTAGE POWER NEED TO EACH LIFT STATION.
17.

A LOW VOLTAGE DISTRIBUTION PANEL "LDP" WITH 100A/208V/120V/3φ, PER PANEL "LDP" SCHEDULE TO BE INSTALLED IN NEMA 4X ENCLOSURE NEXT TO STEP DOWN TRANSFORMER. SIZE OF TRANSFORMER TO BE DETERMINED BY ENGINEER OF RECORD AND WILL BE SHOWN ON PLANS.
18.
19.

A THREE PHASE "TVSS" TO BE INSTALLED DIRECTLY TO "DP" BUS BAR THROUGH 30A/3P BREAKER WITH SHORT STRAIGHT WIRE AND TO BE GROUNDED (FOLLOW MANUFACTURE'S RECOMMENDATIONS).
20.

THE RATING OF "DP" PANEL FOR THREE PUMPS MUST BE DETERMINED BY THE ENGINEER OF RECORD BUT NOT LESS THAN THE FOLLOWING:
a. IN "DP" PANEL WITH 480V/277V/3φ, THE BUS BAR RATING IS NOT TO BE LESS THAN $(I_{Lump} + 2I_{Pump} + 50A)$
b. IN "DP" PANEL WITH 208V/120V/3φ, THE BUS BAR RATING IS NOT TO BE LESS THAN $(I_{Lump} + 2I_{Pump} + 100A)$
19.

MOTOR PUMP STARTER SHOULD BE "SOFT START". ACROSS THE LINE STARTER ARE NOT ACCEPTABLE.
20.

FPL POWER TO LIFT STATION "DP" PANEL SHOULD BE BALANCED THREE PHASE POWER FROM A PAD MOUNTED TRANSFORMER OR FROM THREE IDENTICAL SINGLE PHASE, POLE MOUNTED. OPEN DELTA, THREE PHASE POWER IS NOT ACCEPTABLE.
21.

FPL TO PROVIDE AND INSTALL AT THE POINT OF CONNECTION OF "LIFT STATION SERVICE CABLE" TO FPL OVER HEAD SYSTEM (LOW VOLTAGE BUSHING OF POLE MOUNTED TRANSFORMER) A LOW VOLTAGE LIGHTENING ARRESTOR ON ALL CABLE LINES.
22.

CONTRACTOR TO FURNISH ALL MATERIALS AND LABOR TO INSTALL GROUNDING SYSTEM FOR "DP/480V" PANEL PER ATTACHED DRAWING.
23.

CONTRACTOR TO FURNISH ALL MATERIAL AND LABOR TO GROUND THE NEUTRAL POINT OF SECONDARY (208V) SIDE OF LOW VOLTAGE TRANSFORMER WITH SAME SIZE OF PHASE CONDUCTORS AND WITH (2)X 3/4" X 12' COPPER CLAD STEEL ROD. ALL CONNECTIONS TO BE CAD WELDED.
24.

CONTRACTOR TO FURNISH ALL MATERIAL AND LABOR TO GROUND ALL ELECTRICAL EQUIPMENT THROUGH THE GROUNDING SYSTEM (NOTE 22). CONDUCTOR TO BE SIZED PER TABLE 250-94 OF NEC CODE.
25.

THE ABOVE NOTES ARE GENERAL FOR LIFT STATIONS.
26.

FOR ALL WALL PENETRATIONS CONTRACTOR SHOULD USE CONCRETE CORE BORING AND ALL PENETRATIONS SHOULD BE THROUGH PVC SLEEVES, AND SEAL WITH G.E. FLEXIBLE SILICON SEALANT.
27.

ALL WALL PENETRATION SHALL BE SEALED W/CAULKING. IF WALL IS FIRE RATED, CAULKING SHOULD BE FIRE RATED 3M AND PAINTED TO MATCH FINAL PAINT.

ELECTRICAL NOTES

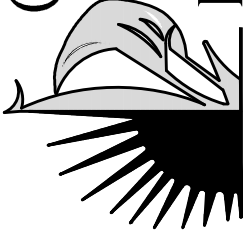
BID SET

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
ELECTRICAL NOTES FOR LIFT STATION
900 AVOCADO ISLE

SHEET NO.	OF
E-1	13
TOTAL:	31
CAD FILE:	
11880-E01-ELEC	
DRAWING FILE NO.	
4-137-1424	

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D

CITY of FORT LAUDERDALE



PUBLIC WORKS DEPARTMENT

ENGINEERING & ARCHITECTURE

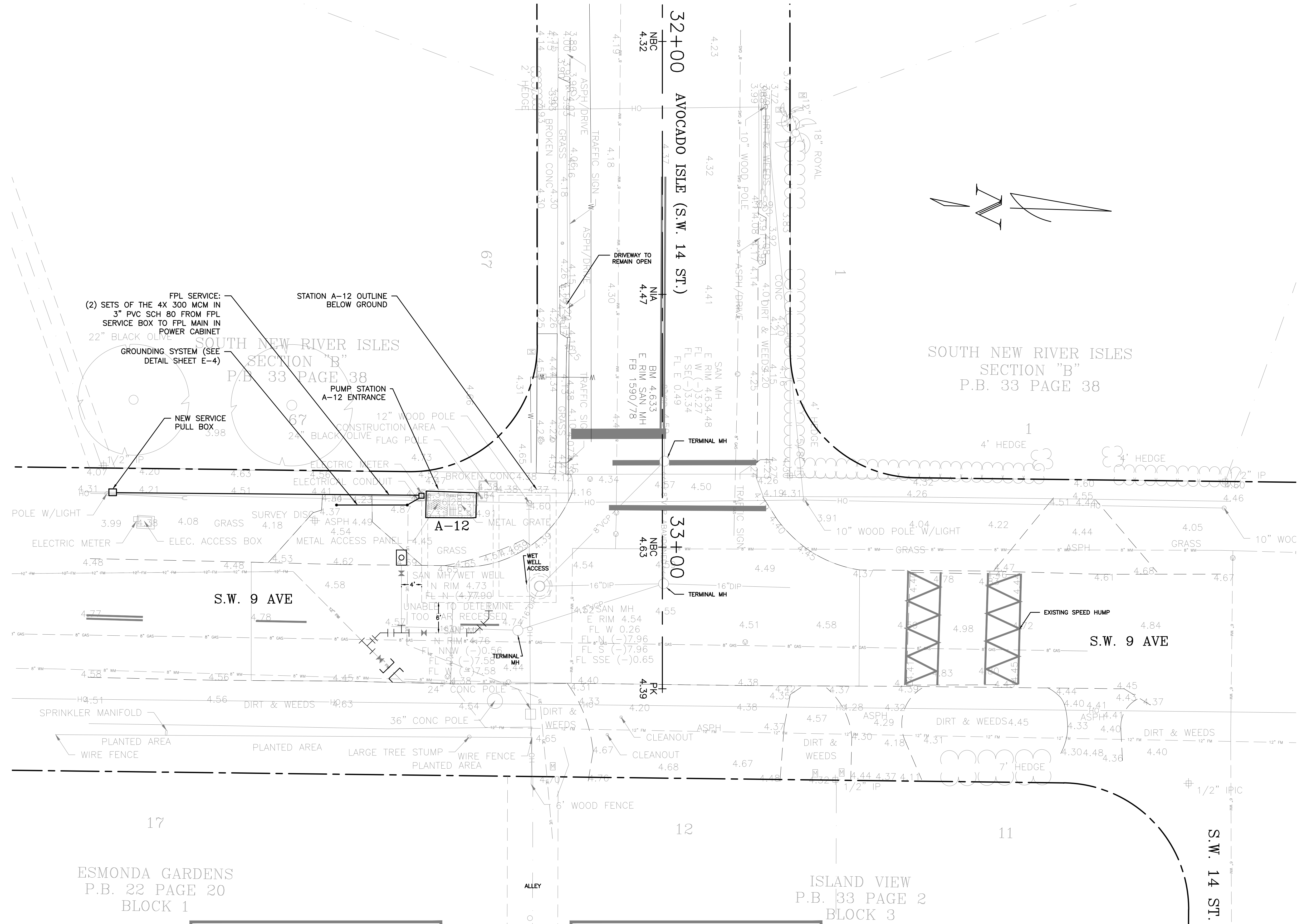
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

DRAWN BY:	DATE:	DESIGNED BY:	SCALE:	CHECKED BY:	FIELD BOOK:
	LMO JULY 2016				
		FM	N/A	SE	

ELECTRICAL ENGINEER
FRED N. METER
REG. No: 36517
DATE:

TEL: (954) 828-5069
FAX: (954) 828-5074

Friday, July 08, 2016 10:15:22 AM



NOTE: ALL GRADES
BASED ON NGVD 1929

N.G.V.D. 29
1.585'
N.A.V.D. 88

ELECTRICAL PLAN

BID SET

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
ELECTRICAL PLAN
900 AVOCADO ISLE

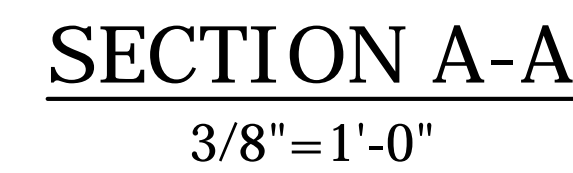
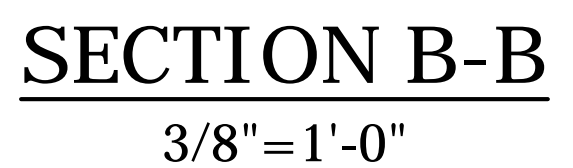
SHEET NO.	OF
E-2	14
TOTAL:	34
CAD FILE:	
11880-E02-ELEC	
DRAWING FILE NO.	
4-13-14	

REVISIONS				
NO.	DATE	BY	CHK'D	DESCRIPTION
1	04/2015	W.D.	S.E.	DATUM CONVERSION

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

DRAWN BY:	CMB	DATE:	JULY 2016
DESIGNED BY:	LMO/SE	SCALE:	1"=10'-0"
CHECKED BY:	SE		
FIELD BOOK:			

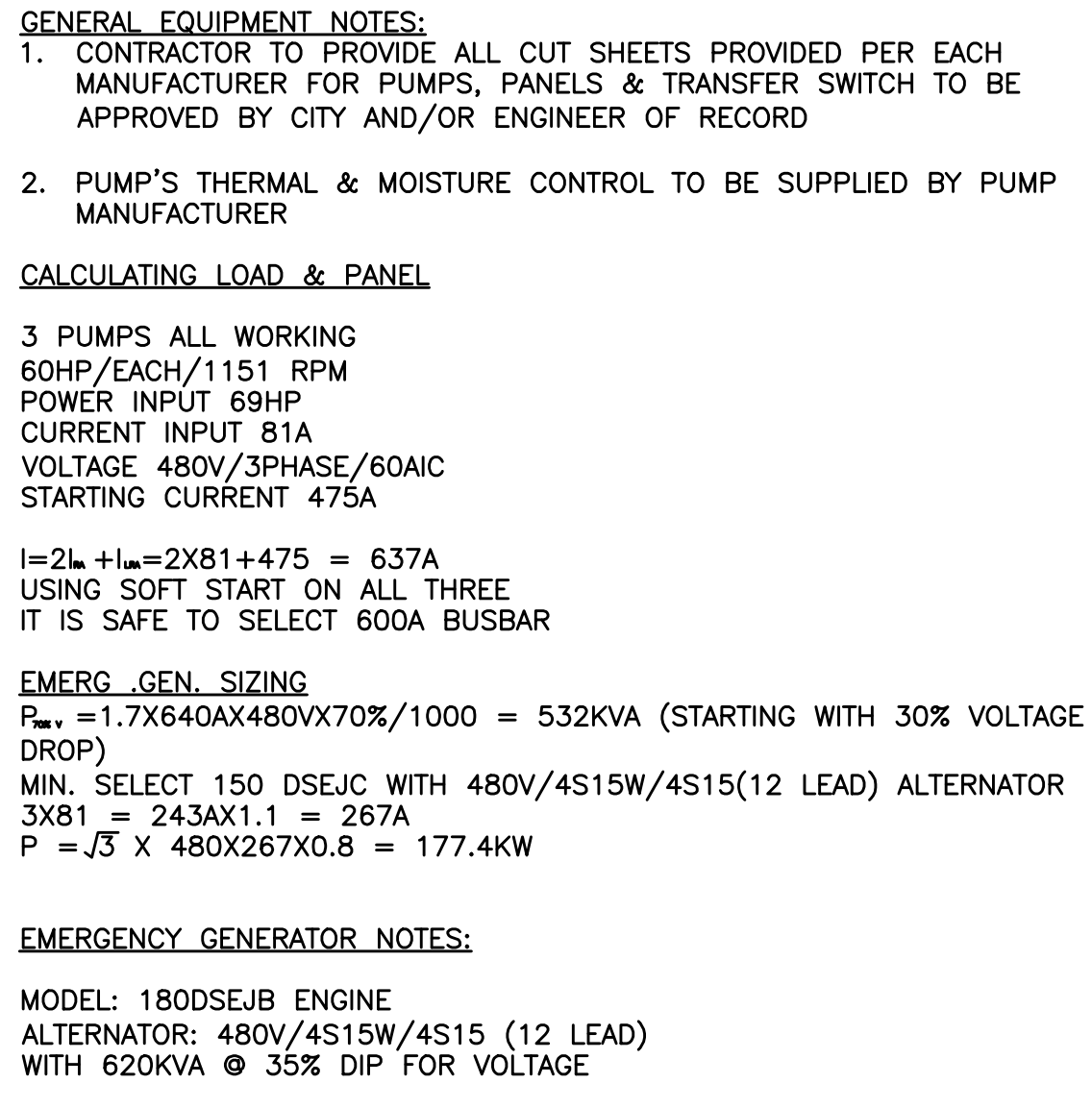
FLA. P.E. NO.
51915
STAN EDWARDS


$$3/8" = 1'-0"$$

$$3/8" = 1'-0"$$

BID SET

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
ELECTRICAL PLAN
900 AVOCADO ISLE

Page 648 of 663



*NOTE: PLEASE SEE BID SPECIFICATION PACKAGE FOR COMPLETE EQUIPMENT SPECIFICATIONS.

BID SET

Page 649 of 663

PANEL "MDP" SCHEDULE																		
RATING:			VOLTAGE: 600 AMPS/480V/277V/3 PHASE									AIC: 50,000 AIC						
TYPE: LOAD CENTER			NEMA RATING: 4X									MOUNT: WALL-MOUNTED						
LOCATION:																		
CIRCUIT #	TRIP AMPS PHASE	CIRCUITS DESCRIPTION	CIRCUIT WIRING		PANEL CONNECTION	V.A. LOAD			CIRCUITS DESCRIPTION	CIRCUIT WIRING		TRIP AMPS PHASE	CIRCUIT #					
			WIRING	COND. INCH		PHASE	PHASE	PHASE		WIRING	COND. INCH							
1	A	150	PUMP #1 60 HP	3X#1/0 +1X#6(G)	2"C.	← 1		22,144	PUMP #2 60 HP	3X#1/0 +1X#6(G)	2"C.	150	A	2				
		→ 2					22,144											
3	B	150				← 3		22,144										
5	C	150				→ 4		22,144										
			PUMP #3 60 HP	3X#1/0 +1X#6(G)	2"C.	← 5		22,144	SPARE	-	-	150	C	6				
7	A	150				→ 6		22,144										
9	B	150				← 7		22,144										
11	C	150				→ 8												
			30KVA TRAN 480V/208V	4X#8	1"C.	← 9		22,144	PHASE MONITOR	4X#12	3/4"C.	150	A	8				
13	A	40				→ 10												
15	B	40				← 11		22,144										
17	C	40				→ 12												
			SPARE	-	-	← 13		10,000	TVSS METER TREATER	4X#1	N/A	20	C	18				
19	A	20				→ 14												
21	B	20				← 15		10,000										
23	C	20				→ 16												
			TOTAL VA/ PHASE	AMPS/PHASE (A)		← 17		10,000				30	B	22				
25	A					→ 18												
27	B					← 19												
29	C					→ 20												
			TOTAL VA/ PHASE			AMPS/PHASE (A)		← 21								30	C	24
								→ 22										
								← 23										
								→ 24										
								76,432										
								276A										
								276A										
								276A										

PANEL "LDP" SCHEDULE																	
RATING:			VOLTAGE: 100 AMPS/208V/120V/3 PHASE/4W									AIC: 10,000 AIC					
TYPE: LOAD CENTER			NEMA RATING: 4X									MOUNT: WALL-MOUNTED					
LOCATION:																	
CIRCUIT #	TRIP AMPS PHASE	CIRCUITS DESCRIPTION	CIRCUIT WIRING		PANEL CONNECTION	V.A. LOAD			CIRCUITS DESCRIPTION	CIRCUIT WIRING		TRIP AMPS PHASE	CIRCUIT #				
			WIRING	COND. INCH		PHASE	PHASE	PHASE		WIRING	COND. INCH						
1	A	20	EXHAUST FAN	3X#12	1/2"C.	← 1		200	ELEC. ROOM LIGHTING	3X#12	1/2"C.	20	A	2			
						→ 2		400									
3	B	20				← 3		200									
						→ 4		700									
5	C	20	SPARE	-	-	← 5			SUMP PUMP	3X#12	1/2"C.	20	B	4			
						→ 6		600									
7	A	20				← 7											
						→ 8		850									
9	B	20	ELEC.& 2ND FLOOR RECPT.	3X#12	1/2"C.	← 9		1800	4-PLEX, 1ST FL, GFI RECEPT	4X#12	1/2"C.	20	B	10			
						→ 10		500									
11	C	20	1ST FLOOR RECEPTACLE	3X#12	1/2"C.	← 11		1800							20	C	12
						→ 12		500									
13	A	20	LIGHTING	3X#12	1/2"C.	← 13		1500	EMERGENCY REPAIR 3φ	5X#12	3/4"C.	20	A	14			
						→ 14		1000									
15	B	20	SPARE	-	-	← 15									20	B	16
						→ 16		1000									
17	C	20	PUMP HOUSE RECEPTACLE	3X#12	1/2"C.	← 17		500	20	C	18						
						→ 18		1000									
19	A	20	ELECTRICAL ROOM RECPT.	3X#12	1/2"C.	← 19		500	SPARE	-	-	20	A	20			
						→ 20											
21	B	20	SPARE	-	-	← 21			SPARE	-	-	20	B	22			
						→ 22											
23	C	20	SPARE	-	-	← 23			-	-	-		C	24			
						→ 24											
25	A	20	SPARE	-	-	← 25			-	-	-		A	26			
						→ 26											
27	B	20	SPARE	-	-	← 27			-	-	-		B	26			
						→ 28											
29	C	20	SPARE	-	-	← 29			-	-	-		C	28			
						→ 30											
TOTAL VA/ PHASE						3,950	4,700	4,400									
AMPS/PHASE (A)						33A	35A	32.5A									

ELECTRICAL PANEL

BID SET

City of Fort Lauderdale

Public Works Department

Engineering & Architecture

100 North Andrews Avenue, Fort Lauderdale, Florida 33301

TEL: (954) 828-5069

FAX: (954) 828-5074

PROJECT # 11880

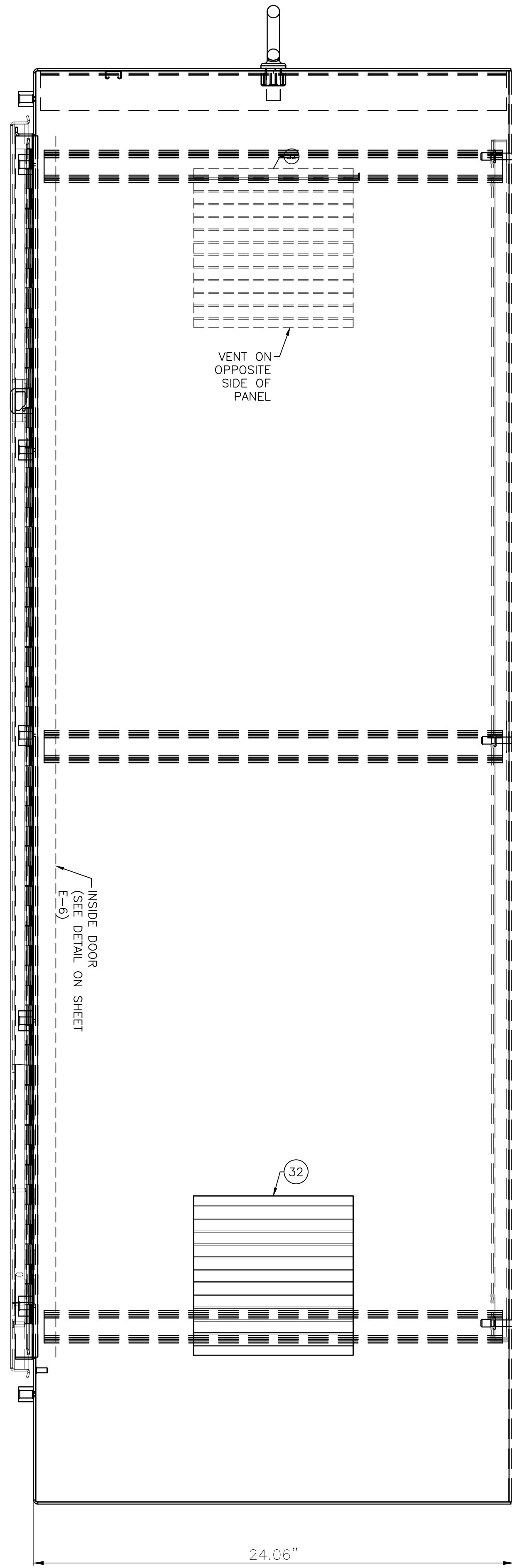
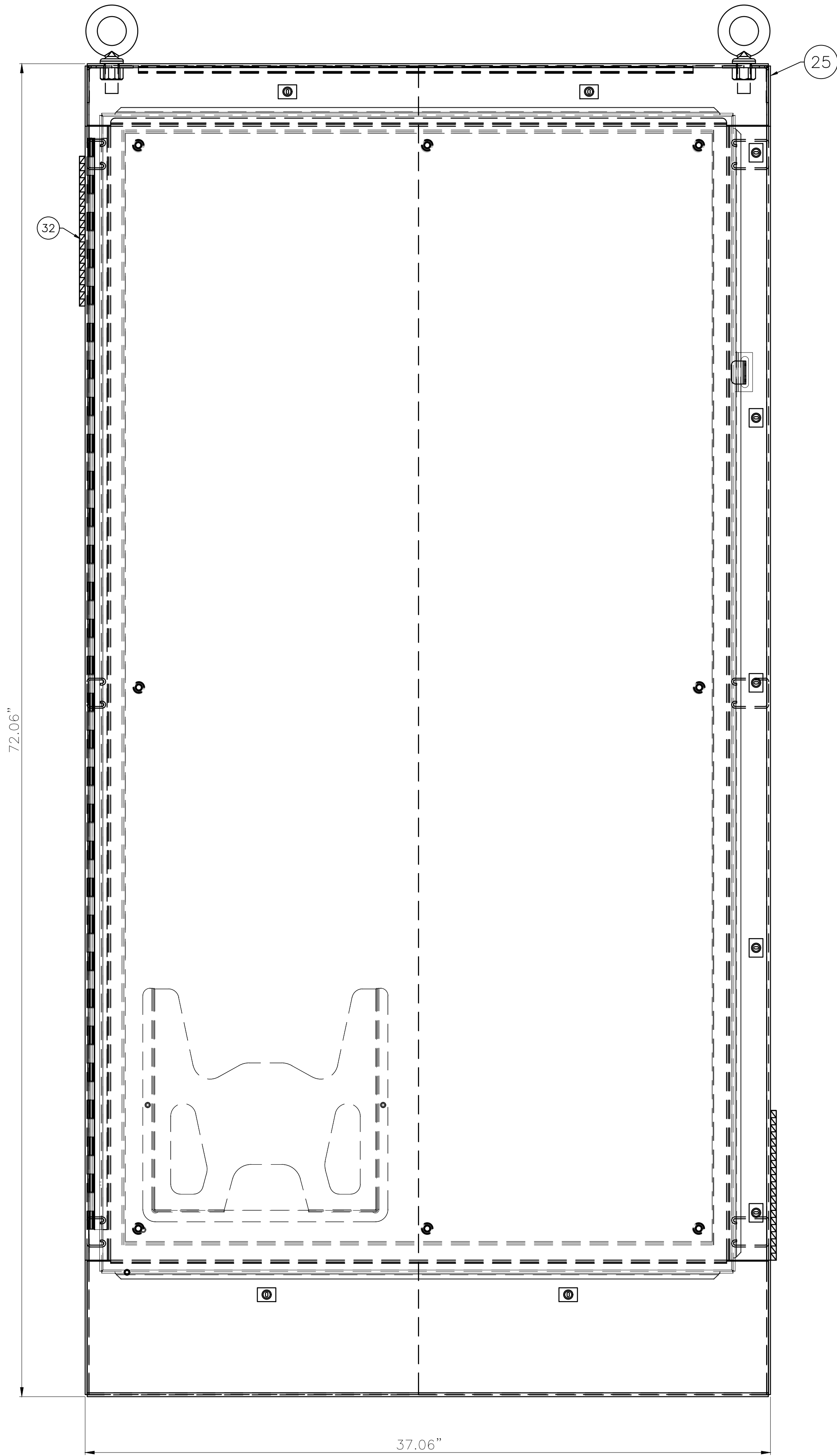
PUMP STATION REHAB

SANITARY SEWER PUMP STATION A-12

ELECTRICAL PANELS

900 AVOCADO ISLE

PLOT DATE: July 8, 2016



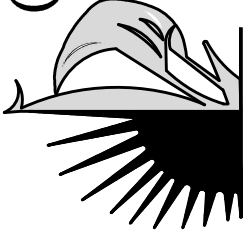
CONTROL PANEL ENCLOSURE

BID SET

PROJECT # 11880
PUMP STATION REHAB
CONTROL PANEL A-12
CONTROL PANEL ENCLOSURE
900 AVOCADO ISLE

SHEET NO.	OF
E-6	14
TOTAL:	34
CAD FILE:	
11880-E06-ELEC	
DRAWING FILE NO.	
4-t3211824	

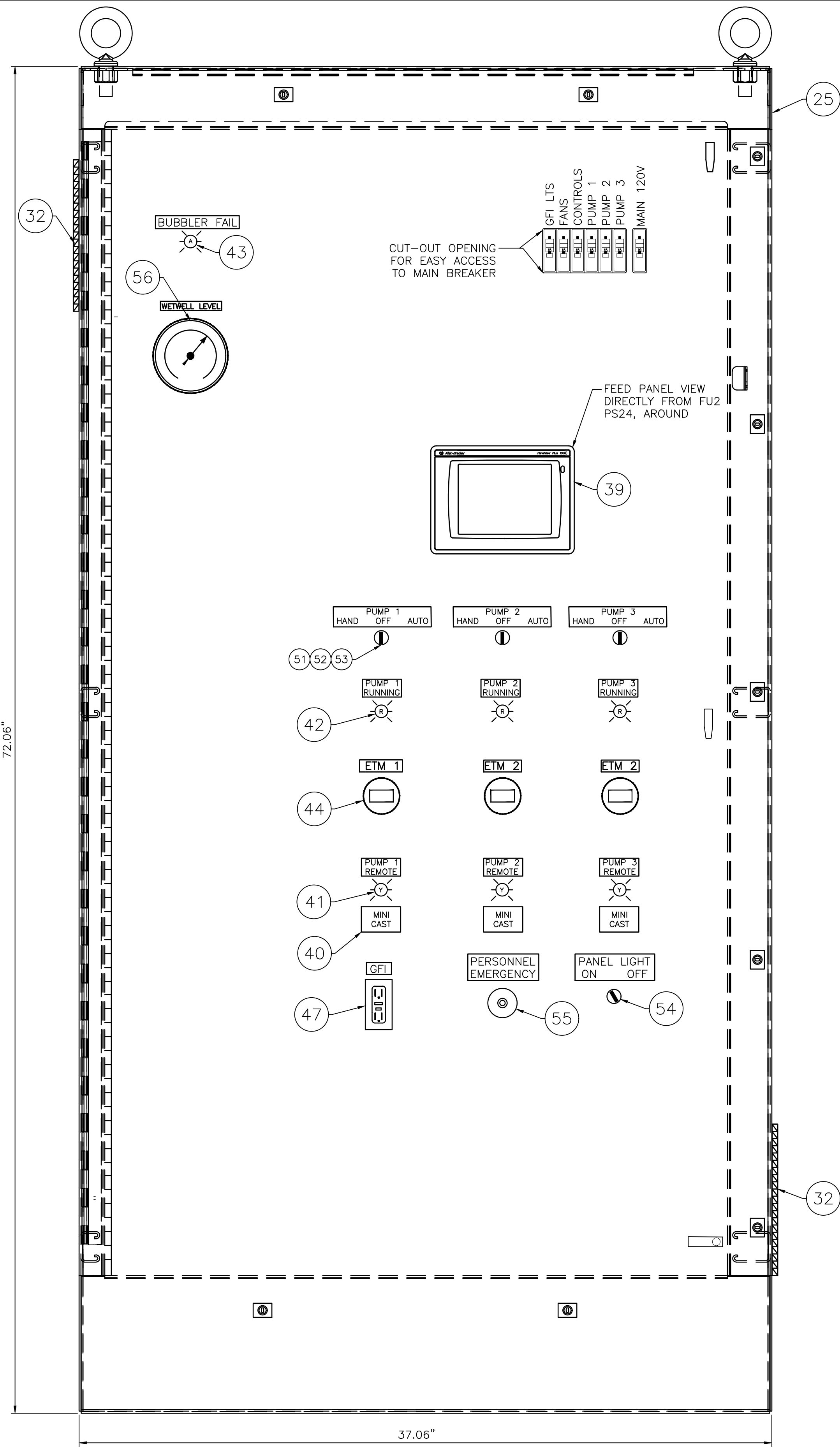
REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D



CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
DISTRIBUTION & COLLECTION
4250 NW 10 Ave, Fort Lauderdale, Florida 33309

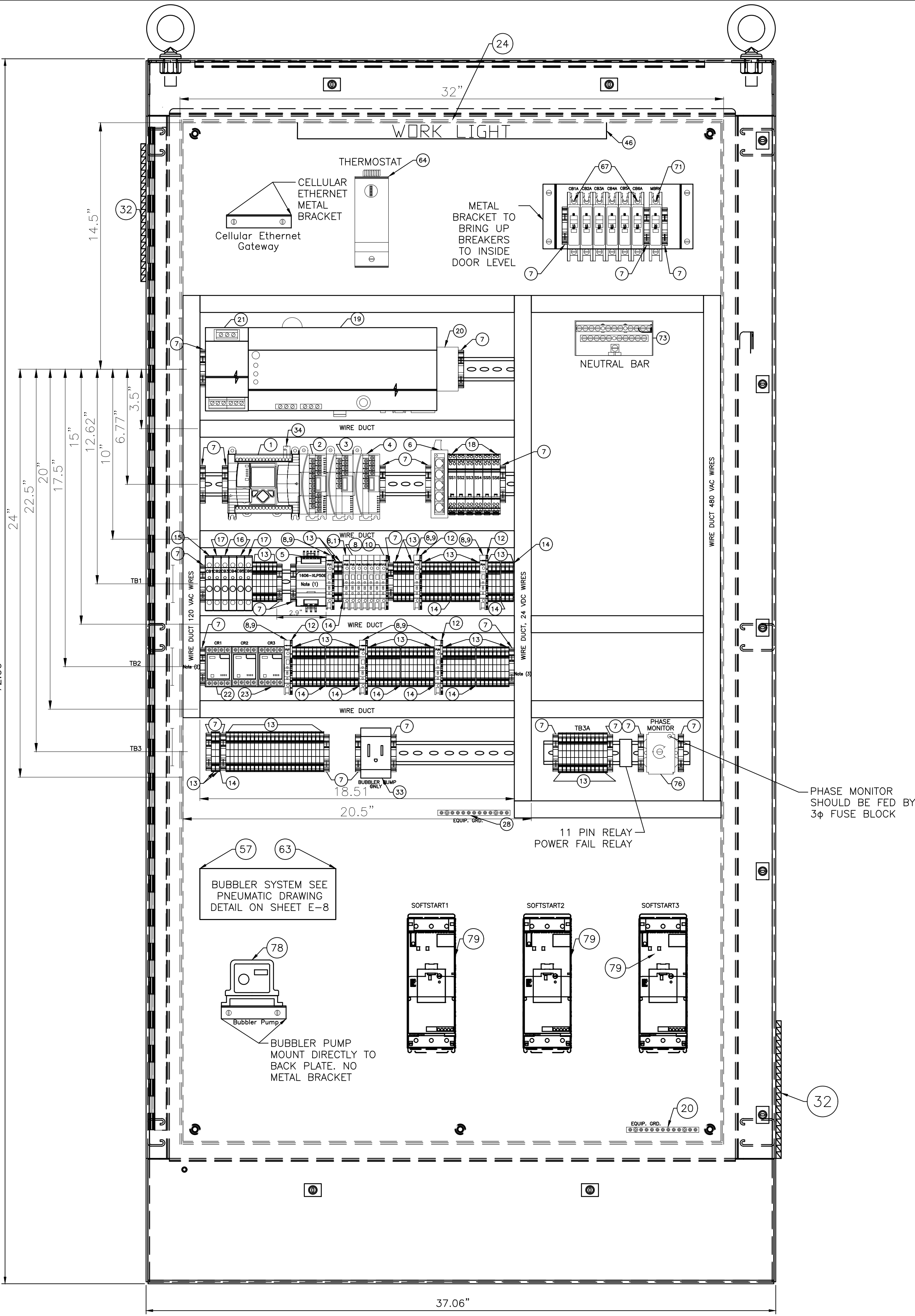
DRAWN BY:		DATE:
WD	DG	JULY 2016
DESIGNED BY:		SCALE:
DG	DG	NTS
CHECKED BY:		FIELD BOOK:
DG	DG	

PLOT DATE: July 8, 2016



ENCLOSURE NOTES:

- ENCLOSURE: 72.06"x37.06"x24.06" NEMA 4, 12 POWDER PAINTED STEEL WITH INNER DOOR, AND WHITE BACK PANEL.
- NO ELECTRICAL DEVICES TO BE MOUNTED DIRECTLY BELOW THE PRESSURE GAUGE-WETWELL LEVEL.



GENERAL ELECTRICAL NOTES:

- FINAL COMPONENT SIZE AND SELECTION TO BE DETERMINE BY SYSTEM SUPPLIER IN COORDINATION WITH CITY. IF PANEL VIEW PLUS 700 OR 1000 IS REQUIRED CHANGE POWER SUPPLY TO AB MODEL 1606-XLP100E. MODEL 1606-XLP100E POWER SUPPLY IS WIDHER THAN POWER SUPPLY 1606 XLP50E LEAVE2.9 IN SPACE REQUIRED FOR THE 1606-XLP100E MODEL.
- USE LEFT WIRE DUCT FOR 120 VAC WIRES AND RIGHT FOR 480 VAC WIRES.
- USE MIDDLE WIRE DUCT FOR 24 VDC WIRES.
- DON'T LEAVE EXTRA WIRE INSIDE THE WIRE WAYS, CUT WIRES TO FIT FROM TERMINAL TO TERMINAL.
- ALL THE COMPONENTS OF CONTROL PANEL NEED TO BE UL LISTED.
- THE TOTAL ASSEMBLY WITH ENCLOSURE NEEDS TO BE UL LISTED.

CONTROL PANEL LAYOUT

BID SET

DRAWN BY:	DATE:
WD	JULY 2016
DESIGNED BY:	SCALE:
DG	NTS
CHECKED BY:	
DG	
FIELD BOOK:	

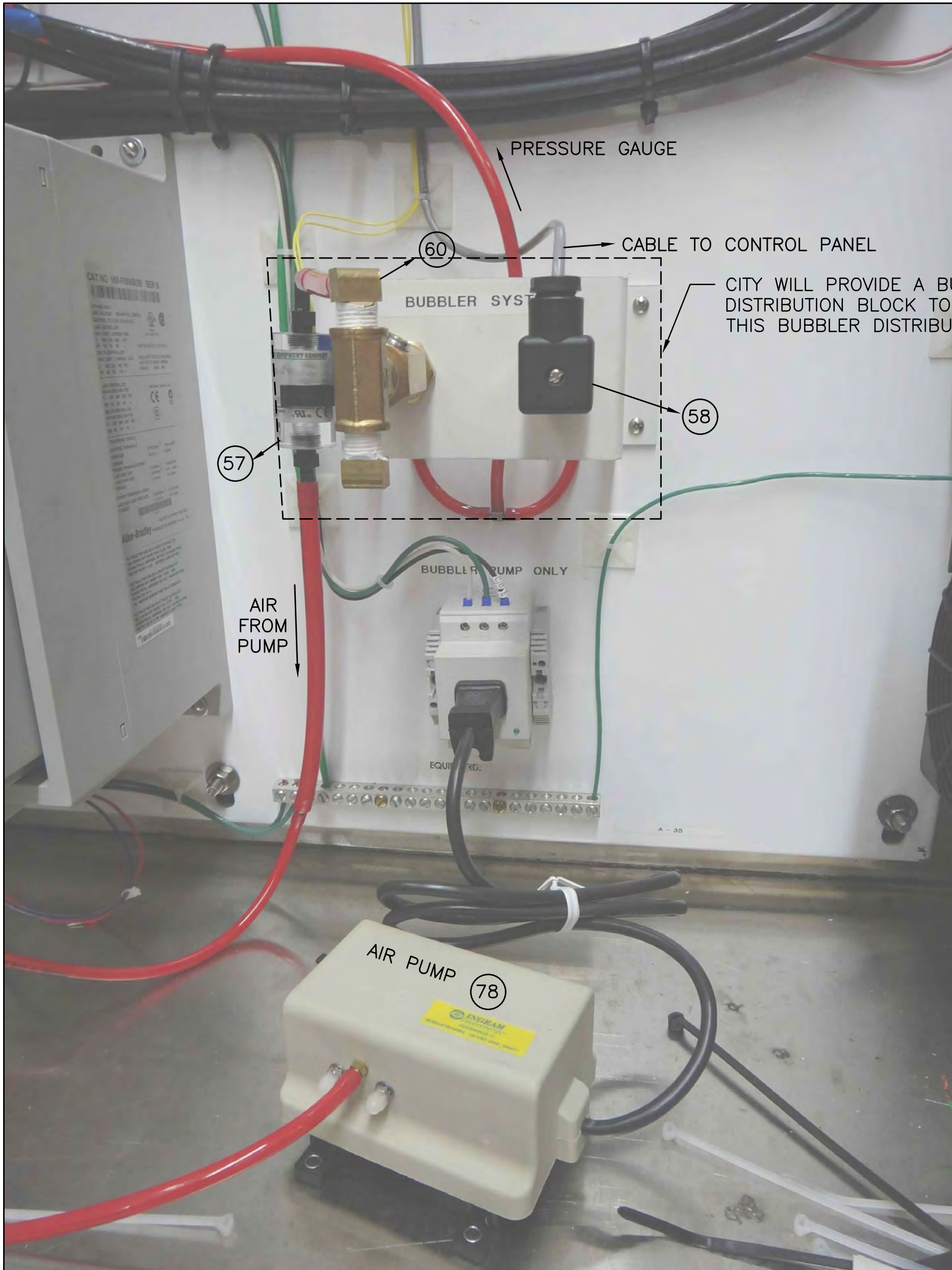
CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
DISTRIBUTION & COLLECTION
4250 NW 10 Ave, Fort Lauderdale, Florida 33309

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D

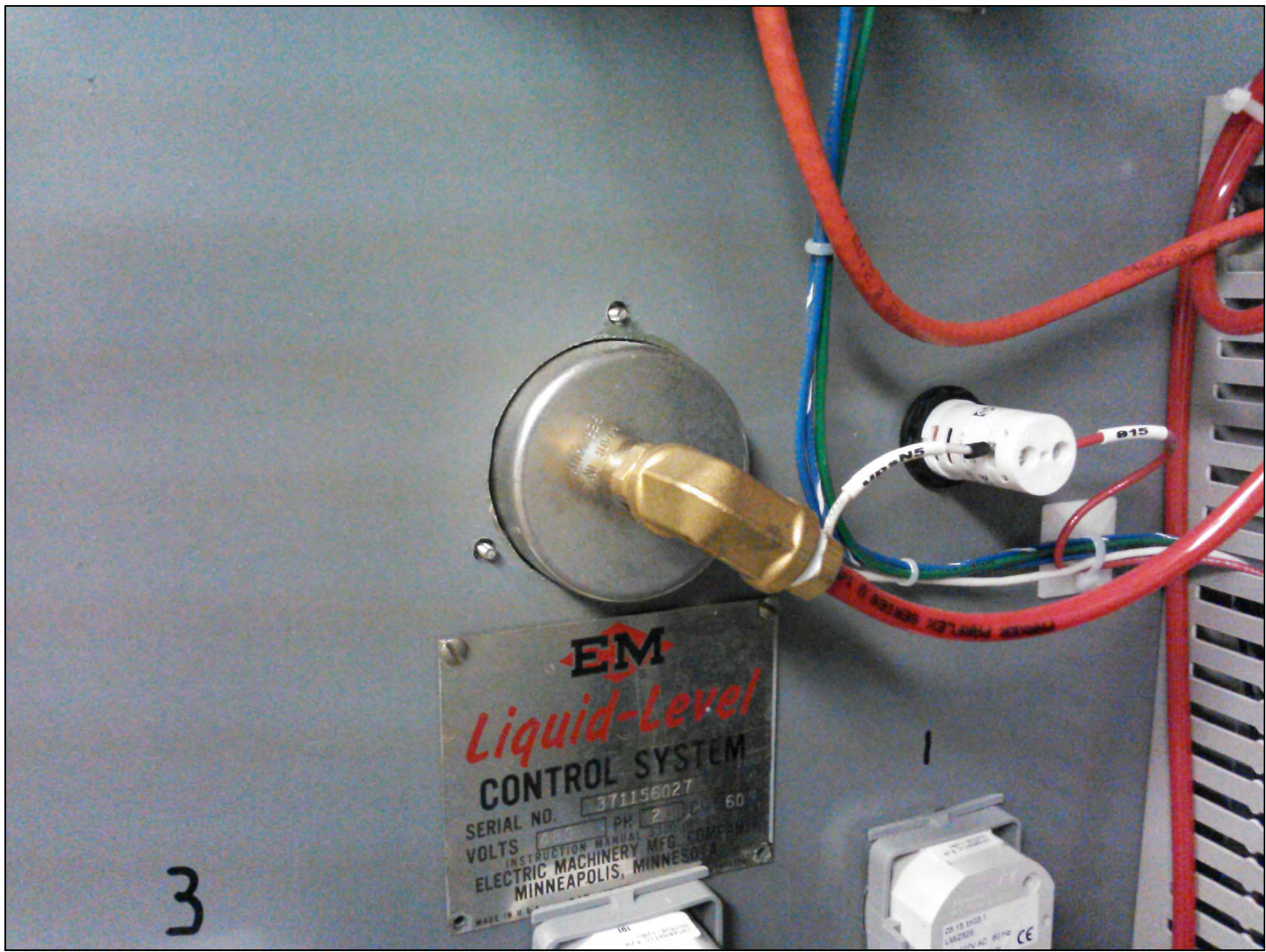
PROJECT # 11880
PUMP STATION REHAB
CONTROL PANEL A-12
CONTROL PANEL LAYOUT
900 AVOCADO ISLE

SHEET NO.	OF
E-7	14
TOTAL:	34
CAD FILE:	
11880-E06-ELEC	
DRAWING FILE NO.	
4-1311824	

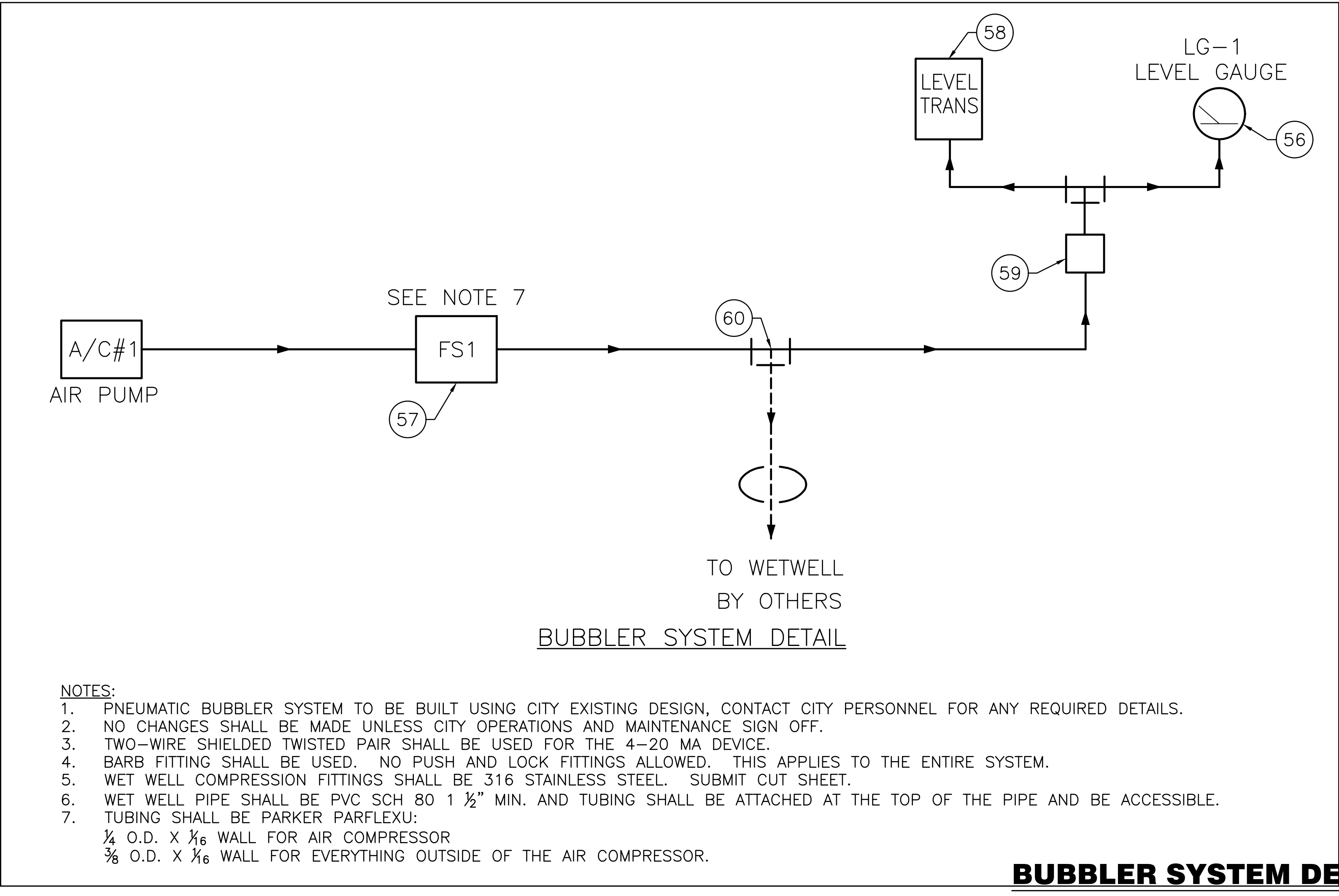
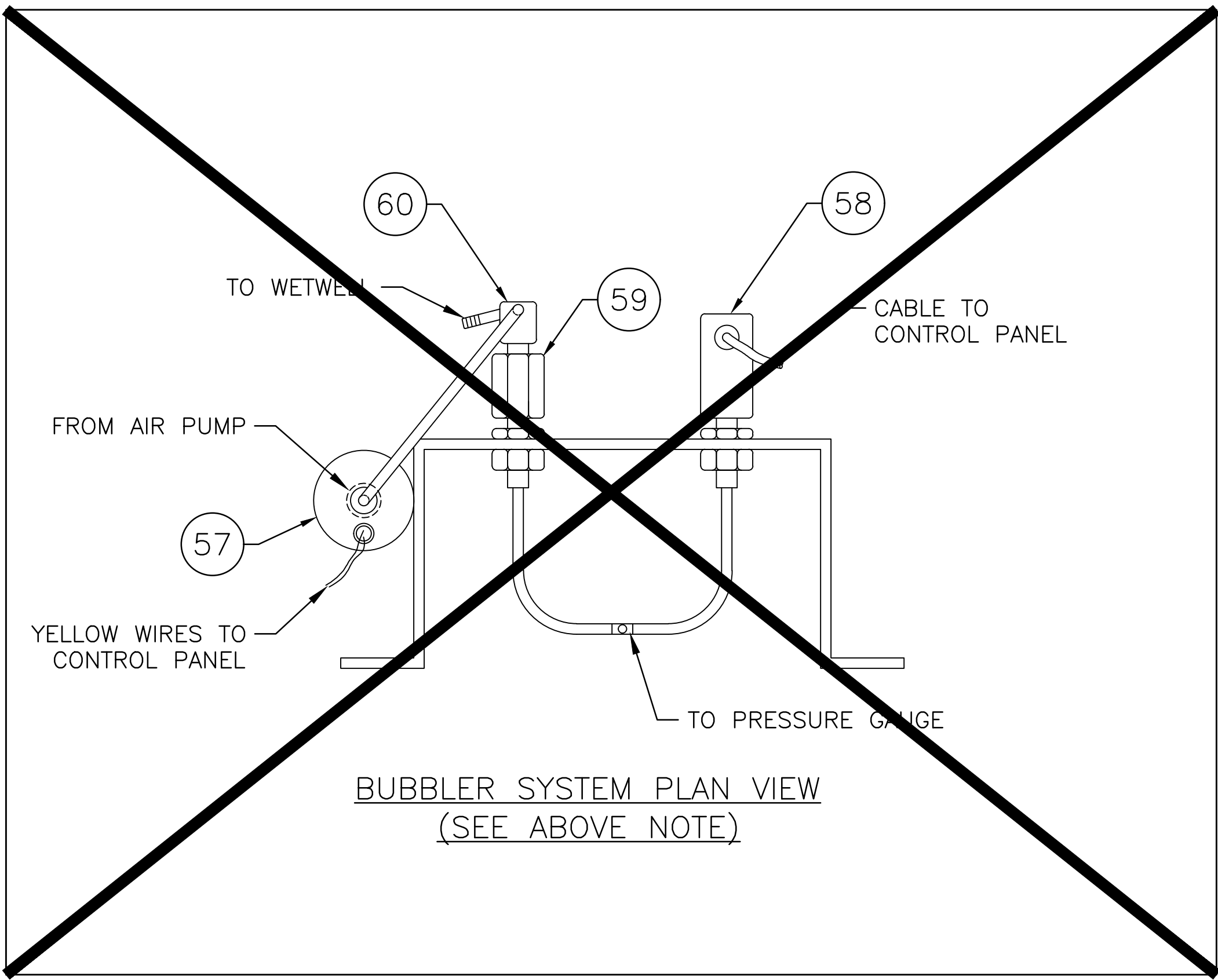
Page 653 of 663 n 65



BUBBLER SYSTEM FRONT VIEW



FRONT DOOR PANEL WET WELL PRESSURE GAUGE INSTALLATION DETAIL



- NOTES:
1. PNEUMATIC BUBBLER SYSTEM TO BE BUILT USING CITY EXISTING DESIGN, CONTACT CITY PERSONNEL FOR ANY REQUIRED DETAILS.
 2. NO CHANGES SHALL BE MADE UNLESS CITY OPERATIONS AND MAINTENANCE SIGN OFF.
 3. TWO-WIRE SHIELDED TWISTED PAIR SHALL BE USED FOR THE 4-20 MA DEVICE.
 4. BARB FITTING SHALL BE USED. NO PUSH AND LOCK FITTINGS ALLOWED. THIS APPLIES TO THE ENTIRE SYSTEM.
 5. WET WELL COMPRESSION FITTINGS SHALL BE 316 STAINLESS STEEL. SUBMIT CUT SHEET.
 6. WET WELL PIPE SHALL BE PVC SCH 80 1 1/2" MIN. AND TUBING SHALL BE ATTACHED AT THE TOP OF THE PIPE AND BE ACCESSIBLE.
 7. TUBING SHALL BE PARKER PARFLEXU:
1/4 O.D. X 1/16 WALL FOR AIR COMPRESSOR
3/8 O.D. X 1/16 WALL FOR EVERYTHING OUTSIDE OF THE AIR COMPRESSOR.

BUBBLER SYSTEM DETAIL

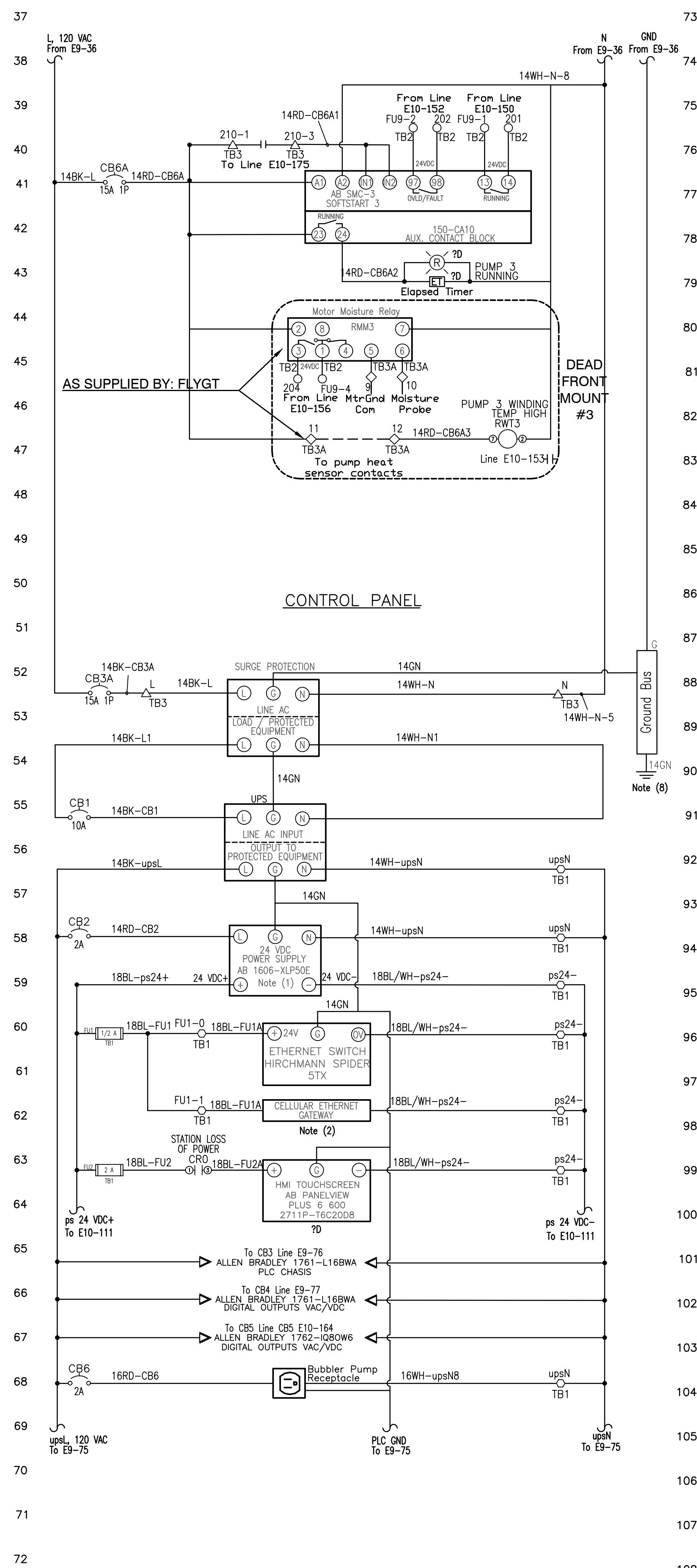
DRAWN BY:	DATE:
WD	JULY 2016
DESIGNED BY:	SCALE:
DG	NTS
CHECKED BY:	
DG	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
DISTRIBUTION & COLLECTION
4250 NW 10 Ave, Fort Lauderdale, Florida 33309

NO.	DATE	BY	CHK'D	DESCRIPTION


PROJECT # 11880
PUMP STATION REHAB
CONTROL PANEL A-12
BUBBLER SYSTEM DETAIL
900 AVOCADO ISLE

SHEET NO.	OF
E-9	14
TOTAL:	34
CAD FILE:	
11880-E08-ELEC	
DRAWING FILE NO.	
4-1311424	



BID SET

SHEET NO.	OF
E-10	14
TOTAL:	34
CAD FILE: 11880-E10-ELEC	
DRAWING FILE NO. 4-13161424	

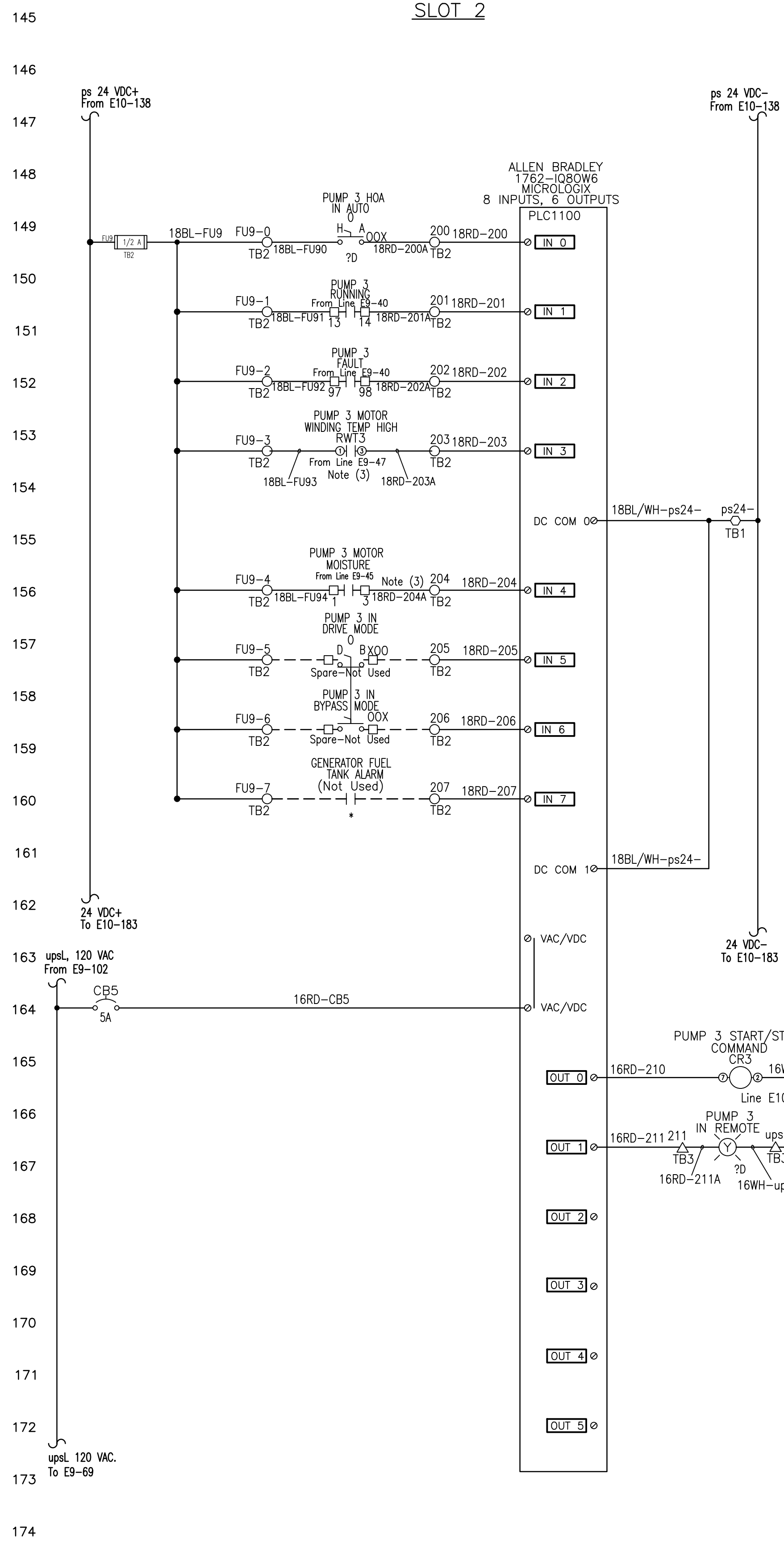


CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
DISTRIBUTION & COLLECTION

4250 NW 10 Ave, Fort Lauderdale, Florida 33309

[illegible]

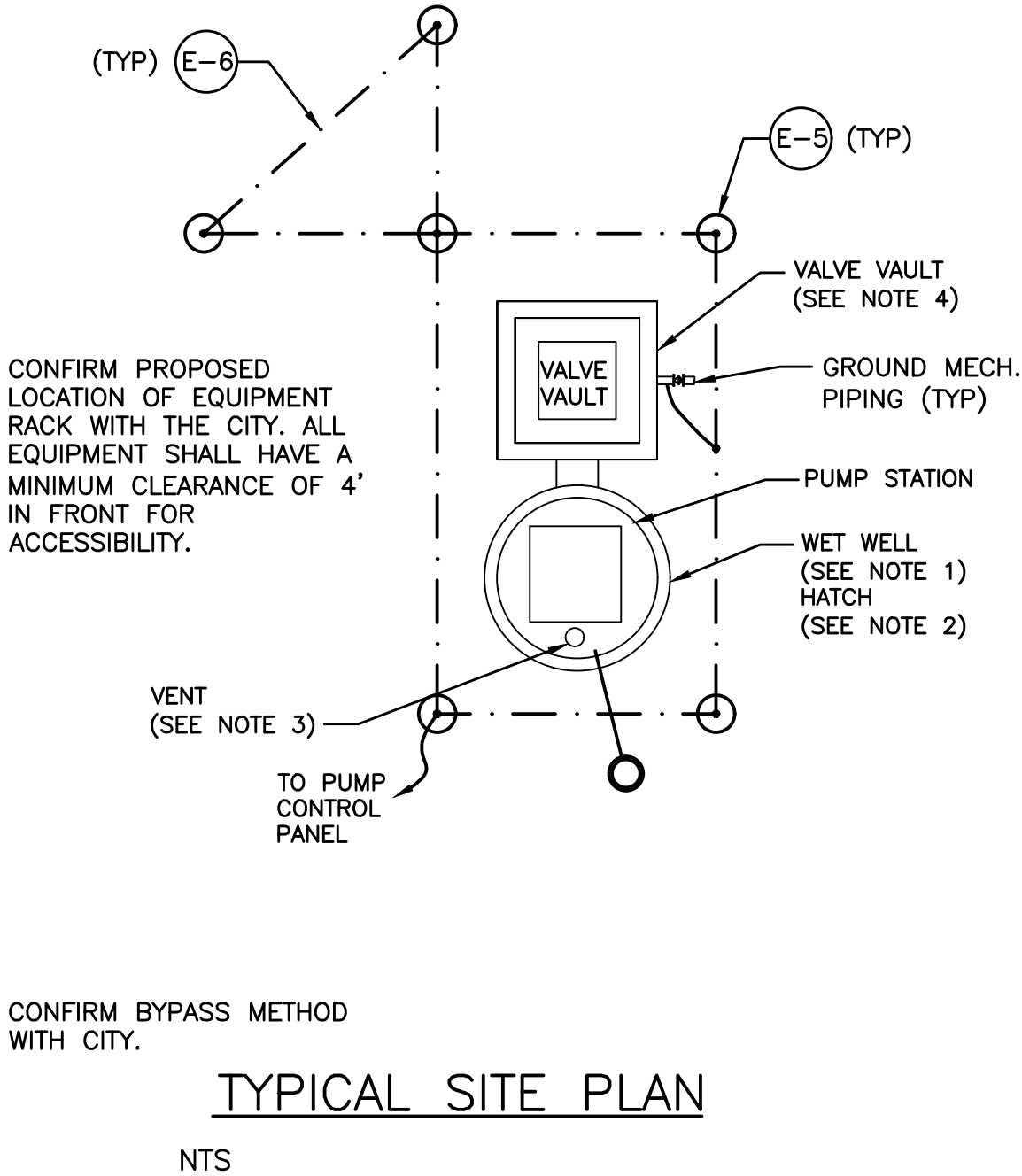
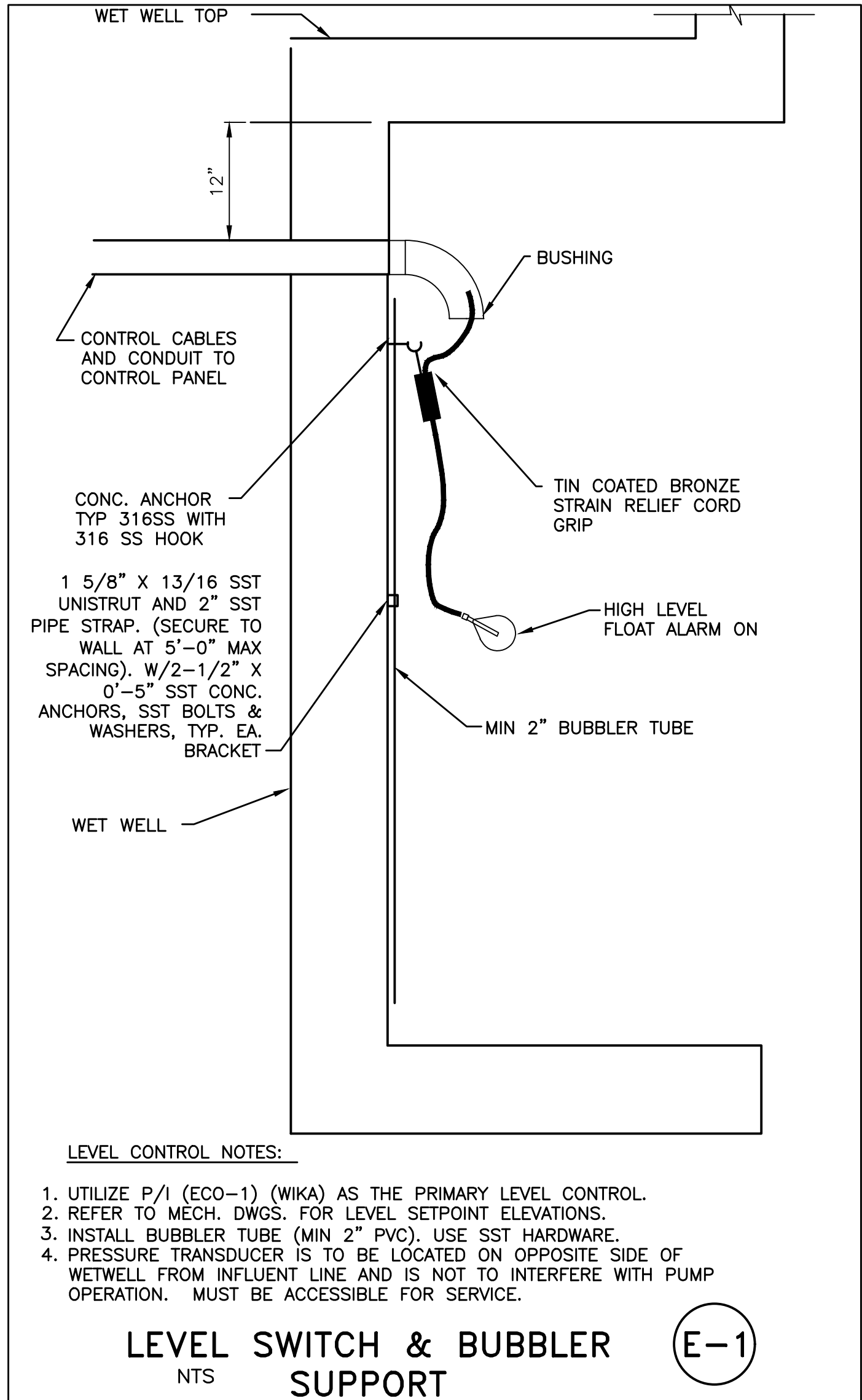
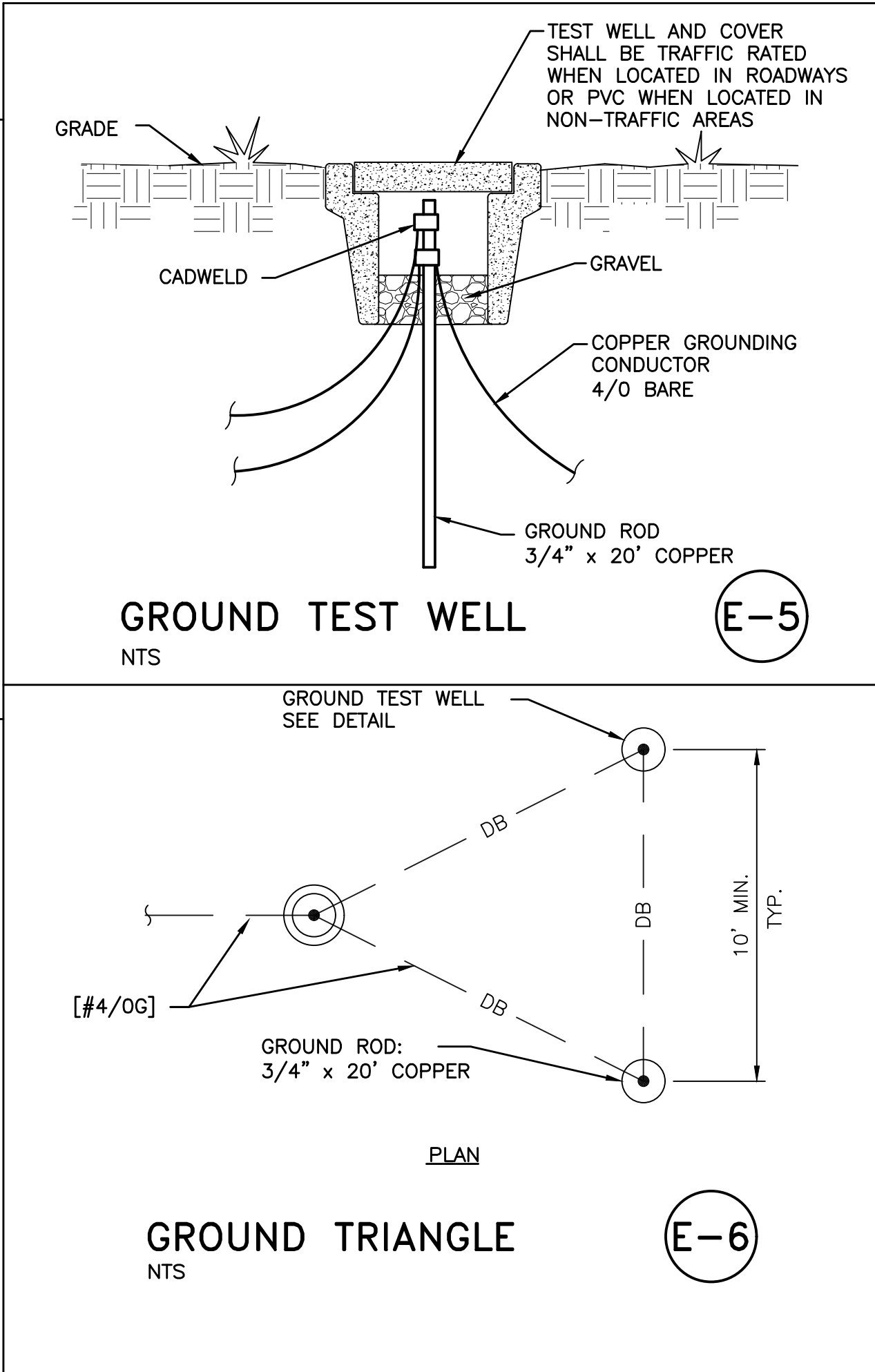
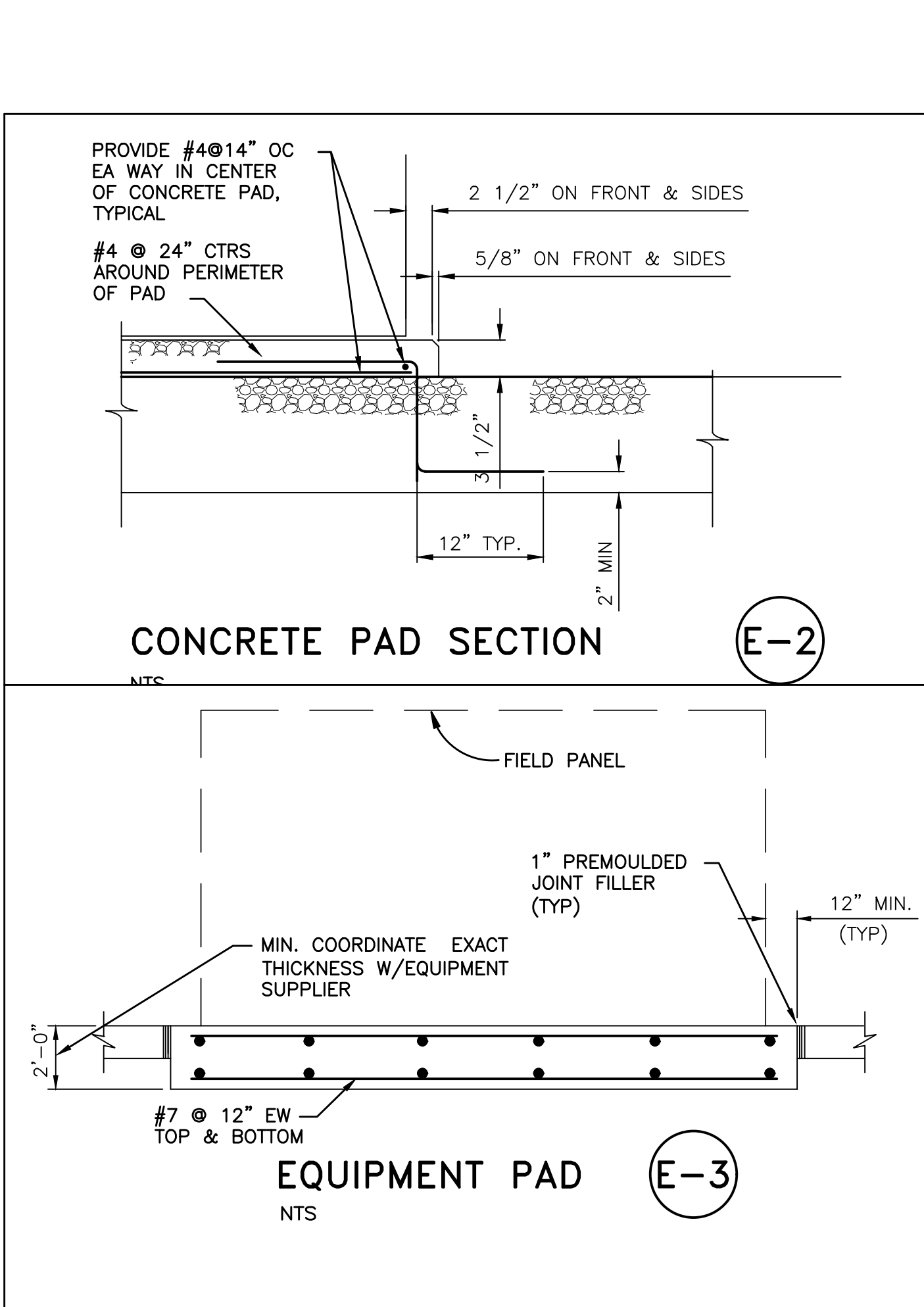
PROJECT # 11880
PUMP STATION REHAB
CONTROL PANEL A-12
PWR. DISTR. & SLOT 0 CONTROL DIAGRAM
900 AVOCADO ISLE





SHEET NO.	OF
E-12	14
TOTAL:	34
CAD FILE:	
11880-E12-ELEC	
DRAWING FILE NO.	
4-137	1424

PLOT DATE: July 8, 2016



- NOTES:**
1. THE AREA INSIDE THE WET WELL IS A HAZARDOUS, CLASS 1, DIV. 2 LOCATION
 2. THE AREA WITHIN 3 FEET FROM THE ACCESS HATCH AND 1.5 FEET ABOVE THE WET WELL SLAB IS A HAZARDOUS, CLASS 1, DIV. 2 LOCATION.
 3. THE AREA WITHIN A 3 FEET RADIUS FROM THE VENT OPENING IS A HAZARDOUS, CLASS 1, DIV. 2 LOCATION.
 4. THE AREA INSIDE THE VALVE VAULT IS A HAZARDOUS, CLASS 1, DIV. 2 LOCATION.
 5. NO J-BOXES IN VALVE VAULTS-CONSULT PUMP SUPPLIER FOR LONGER CABLES
 6. STATION HOSE BIB SHALL BE GROUNDED TO GROUNDING RING.

ELECTRICAL ENGINEER
FRED J. MATHIAS
REG. No. 35517
DATE:

DATE: JULY 2016
ENG
DESIGNED BY: SCALE: N.T.S.
CHECKED BY: WW2011
FIELD BOOK: WW2011

TEL: (954) 828-5059
FAX: (954) 828-5074

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D
1	11/02/10	LMO	JP
2	08/02/11	LMO	JP

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
SEWER PUMP DETAILS
1398 SW 9TH AVE

SHEET NO. OF
E-13 13

TOTAL: 34
CAD FILE: 11880-E13-DETL
DRAWING FILE NO. 4-13-1424

BID SET

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION																					
	CONTROL DEVICE – FURNISHED AND INSTALLED UNDER OTHER SECTIONS; RACEWAYS, CONDUCTORS, AND CONDUCTOR END TERMINATORS FURNISHED AND INSTALLED UNDER THIS SECTION AS SHOWN. CONDUCTOR FINAL CONNECTIONS PROVIDED UNDER OTHER SECTIONS.		CONVENIENCE RECEPTACLE – DUPLEX UNLESS SPECIFIED OTHERWISE WP–WEATHERPROOF C– CLOCK HANGER TL– TWIST LOCK CRE–CORROSION RESISTANT		CONTACT – NORMALLY OPEN WITH NEMA SIZE INDICATED AS APPLICABLE		TIME DELAY CONTACTS																					
	CONNECTION POINT TO EQUIPMENT SPECIFIED. FURNISHED AND INSTALLED UNDER OTHER SECTIONS. RACEWAY, CONDUCTOR AND CONNECTION IN THIS SECTION.		CONVENIENCE RECEPTACLE, PEDESTAL, DUPLEX SINGLE FACE UNLESS INDICATED OTHERWISE		CONTACT – NORMALLY CLOSED WITH NEMA SIZE INDICATED AS APPLICABLE		NORMALLY OPEN, TIMED OPEN																					
	INDICATES RACEWAYS AND CIRCUIT NUMBERS. FIRST NUMBER IS RACEWAY AND NUMBER AFTER DASH IS CIRCUIT NUMBER. 5–E(3) INDICATES THAT THERE ARE 3 EMPTY RACEWAY NO.5. SEE SCHEDULE.		RECEPTACLE – 240V., 1 , AMPERAGE INDICATED		OVERLOAD RELAY HEATER		NORMALLY OPEN, TIMED CLOSED																					
	MAJOR ELECTRICAL COMPONENT OR DEVICE – NAME OR IDENTIFYING SYMBOL AS SHOWN.		RECEPTACLE, SPECIAL PURPOSE – AMPERAGE AS INDICATED		MAGNETIC STARTER WITH NEMA SIZE INDICATED		NORMALLY CLOSED, TIMED OPEN																					
	BRANCH CIRCUIT PANEL BOARD		DUPLEX CONVENIENCE RECEPTACLE – FLUSH IN FLOOR		CIRCUIT BREAKER, MAGNETIC TRIP ONLY, FRAME SIZE SHOWN, 3 POLE UNLESS INDICATED OTHERWISE.		NORMALLY CLOSED, TIMED CLOSED																					
	UNIT HEATER NO.1 SEE SCHEDULE		MULTI OUTLET ASSEMBLY		CIRCUIT BREAKER, THERMAL MAGNETIC TRIP SHOWN, 3 POLE UNLESS INDICATED OTHERWISE.		LIQUID LEVEL																					
	TELEPHONE TERMINAL CABINET		WALL CLOCK WITH CLOCK HANGER CONVENIENCE RECEPTACLE		CIRCUIT BREAKER WITH CURRENT LIMITING FUSES, TRIP AND FUSE RATING INDICATED, 3 POLE UNLESS INDICATED OTHERWISE.		OPENS ON RISING LEVEL, CLOSSES ON FALLING LEVEL																					
	TERMINAL JUNCTION BOX		TELEPHONE RECEPTACLE (OUTLET BOX ONLY) FLUSH IN FLOOR		FUSED SWITCH, SWITCH AND FUSE CURRENT RATING INDICATED, 3 POLE UNLESS INDICATED OTHERWISE.		CLOSSES ON RISING LEVEL, OPENS ON FALLING LEVEL																					
	WOUND–ROTOR MOTOR, HORSEPOWER INDICATED		TELEPHONE RECEPTACLE (OUTLET BOX ONLY)		SWITCH – CURRENT RATING INDICATED, 3 POLE UNLESS INDICATED OTHERWISE.		PRESSURE OR VACCUUM																					
	MOTOR, SQUIRREL CAGE INDUCTION – HORSEPOWER INDICATED		GENERAL CONTROL OR WIRING DEVICE. NEMA 1 ENCLOSURE UNLESS INDICATED OTHERWISE. LETTER SYMBOLS OR ABBREVIATIONS INDICATE TYPE OF DEVICE.		DRAWOUT AIR CIRCUIT BREAKER, LOW VOLTAGE		OPENS ON RISING PRESSURE, CLOSSES ON FALLING PRESSURE																					
	LUMINAIRE – SEE SCHEDULE		PUSH–BUTTON STATION, NEMA 1 ENCLOSURE UNLESS INDICATED OTHERWISE. (WP = NEMA 4 ENCLOSURE) SEE CONTROL DIAGRAMS FOR TYPE PUSH BUTTON REQUIRED.		DRAWOUT AIR CIRCUIT BREAKER, MEDIUM VOLTAGE		CLOSSES ON RISING PRESSURE, OPENS ON FALLING PRESSURE																					
	LUMINAIRE – SEE SCHEDULE		NONFUSED DISCONNECT SWITCH, SIZE INDICATED, 3 POLE UNLESS INDICATED OTHERWISE, NEMA 1 ENCLOSURE, WP = WEATHERPROOF (NEMA 3R)		DRAWOUT FUSED SWITCH, MEDIUM VOLTAGE		FLOW																					
	LUMINAIRE AND POLE – SEE SCHEDULE		FUSED DISCONNECT SWITCH, SIZE INDICATED (60/40, 60 = SWITCH RATING: 40 = FUSE RATING) 3 POLE UNLESS INDICATED OTHERWISE, NEMA 1 ENCLOSURE, WP = WEATHERPROOF (NEMA 3R)		LIGHTNING ARRESTER		OPENS ON HIGH FLOW, CLOSSES ON LOW FLOW																					
	WALL MOUNTED LUMINAIRE – SEE SCHEDULE		CONTACTOR, MAGNETIC, NEMA SIZE INDICATED, NEMA 1 ENCLOSURE, UNLESS INDICATED OTHERWISE.		FUSE		CLOSSES ON HIGH FLOW, OPENS ON LOW FLOW																					
	FLOOD LIGHTS – AIM IN THE DIRECTION SHOWN		LIGHTING CONTACTOR, CURRENT RATING INDICATED, NEMA 1 ENCLOSURE UNLESS INDICATED OTHERWISE. SEE CONTROL DIAGRAM FOR NUMBER OF POLES.		CAPACITOR – KVAR INDICATED		TEMPERATURE																					
	EXIT LIGHTS – SEE SCHEDULE		STARTER MAGNETIC NEMA SIZE INDICATED, NEMA 1 ENCLOSURE UNLESS INDICATED OTHERWISE. SEE CONTROL DIAGRAM.		METER WITH SWITCH – SCALE RANGE SHOWN		OPENS ON RISING TEMPERATURE, CLOSSES ON FALLING TEMPERATURE																					
	SMALL LETTER SUBSCRIPT AT SWITCH AND LUMINAIRE INDICATES SWITCHING. SUBSCRIPT NUMBER AT LUMINAIRE INDICATES CIRCUIT IN PANELBOARD.		COMBINATION (FUSE OR CIRCUIT BREAKER ASINDICATED) MAGNETIC STARTER, NEMA SIZE INDICATED, NEMA 1 ENCLOSURE UNLESS INDICATED OTHERWISE. SEE CONTROL DIAGRAM.		GROUND		CLOSSES ON RISING TEMPERATURE, OPENS ON FALLING TEMPERATURE																					
	HOME RUN – DESTINATION SHOWN		METERING FACILITIES		PICK–UP SETTING		LIMIT SWITCH																					
	EXPOSED CONDUIT AND CONDUCTORS*		MULTI–PARTY DESK TOP COMMUNICATIONS SYSTEM STATION WITH REMOTE AMPLIFIER		TIME CURRENT CHARACTERISTIC		HELD OPEN, NORMALLY CLOSED																					
	CONCEALED CONDUIT AND CONDUCTORS*		MULTI–PARTY WALL MOUNTED COMMUNICATIONS SYSTEM STATION WITH INTEGRAL AMPLIFIER		PUSH–BUTTON SWITCH, MOMENTARY CONTACT, NORMALLY OPEN		HELD CLOSED, NORMALLY OPEN																					
	NOTE: * ALL UNMARKED CONDUIT RUNS CONSIST OF TWO NO.12 CONDUCTORS IN CONDUIT. RUNS MARKED WITH CROSSHATCHES INDICATE NUMBER OF NO.12 CONDUCTORS. CROSSHATCH WITH SUBSCRIPT "G" INDICATES GREEN GROUND WIRE. SIZE CONDUIT ACCORDING TO SPECIFICATIONS AND APPLICABLE CODE.		CONE TYPE PAGING SPEAKER, CEILING MOUNTED		PUSH BUTTON SWITCH, MAINTAINED CONTACTS WITH MECHANICAL INTERLOCK		ONE LINE DIAGRAM CONTINUATION SYMBOL A=INTERFACE IDENTIFIER E–2=DWG NUMBER WHERE OTHER END OF CONTINUATION CAN BE FOUND																					
	CROSSHATCHES WITH BAR INDICATE #10 CONDUCTOR. SIZE CONDUIT ACCORDING TO SPECIFICATIONS AND APPLICABLE CODE.		INTERIOR PAGING TRUMPET SOUND REPRODUCER, 120" x 60" WITH REMOTE AMPLIFIER, SURFACE MOUNTED.		3 POSITION SELECTOR SWITCH MAINTAINED CONTACT		PROTECTIVE RELAY XX = 47 PHASE FAILURE/PHASE REVERSE 50 INSTANTANEOUS 51 TIME OVERCURRENT 51GS GROUND FAULT/GROUND SENSOR 51N RESIDUAL CONNECTED GROUND RELAY 86 LOCKOUT RELAY 87 DIFFERENTIAL RELAY																					
	CONDUIT DOWN		OUTDOOR PAGING TRUMPET SOUND REPRODUCER, 120" x 60" WITH REMOTE AMPLIFIER, SURFACE MOUNTED.		TIME DELAY RELAY CONTACT (TIME ACTION INDICATED)		NOTE: THIS IS A STANDARD LEGEND SHEET. SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS SHEET AND NOT ON THE PLANS.																					
	CONDUIT UP		TERMINAL CABINET FOR COMMUNICATIONS SYSTEM		REMOTE DEVICE																							
	CONDUIT, STUBBED AND CAPPED AS SHOWN		FIRE ALARM STATION, MANUAL		SELECTOR SWITCH – MAINTAINED CONTACT – CHART IDENTIFIES OPERATION:																							
	CABLE TRAY – SEE SPECIFICATIONS		FIRE ALARM STATION, AUTOMATIC, HEAT DETECTOR		<table><tr><th></th><th colspan="4">POSITION</th></tr><tr><th>CKT.</th><th>HAND</th><th>OFF</th><th>AUTO</th><th></th></tr><tr><td>1</td><td>X</td><td>0</td><td>0</td><td>X – CLOSED CONTACT</td></tr><tr><td>2</td><td>0</td><td>0</td><td>X</td><td>0 – OPEN CONTACT</td></tr></table>		POSITION				CKT.	HAND	OFF	AUTO		1	X	0	0	X – CLOSED CONTACT	2	0	0	X	0 – OPEN CONTACT			
	POSITION																											
CKT.	HAND	OFF	AUTO																									
1	X	0	0	X – CLOSED CONTACT																								
2	0	0	X	0 – OPEN CONTACT																								
	BUS DUCT – SEE SPECIFICATIONS		FIRE ALARM BELL		CURRENT TRANSFORMER, NUMBER INDICATED																							
	TRENCHING FOR UTILITY COMPANY PRIMARY POWER CUTS		FIRE ALARM HORN		INDICATING LIGHT, PUSH–TO–TEST, LETTER INDICATES COLOR																							
	TRENCHING FOR TELEPHONE COMPANY CIRCUITS		FIRE ALARM IONIZATION DETECTOR		INDICATING LIGHT – LETTER INDICATES COLOR A – AMBER G – GREEN B – BLUE R – RED C – CLEAR W – WHITE																							
	CONCRETE ENCASED CONDUIT		AIR DUCT IONIZATION DETECTOR																									
	DIRECT BURIED CONDUIT		EXHAUST FAN																									
	WALL SWITCH: 2– DOUBLE POLE P– PILOT LIGHT 3– THREE WAY K– KEY OPERATED 4– FOUR WAY D– DIMMER WP–WEATHERPROOF CRE–CORROSION RESISTANT		COMBUSTIBLE GAS DETECTOR																									
	MANUAL MOTOR STARTER SWITCH																											

ELECTRICAL ENGINEER
FRED N. MEHR
REG. No. 35517
DATE:

TEL: (664) 828-5069
FAX: (664) 828-5074

DRAWN BY: DATE: JULY 2016

ENG. DESIGNED BY: SCALE: N/A

WW2011
CHECKED BY: WW2011

FIELD BOOK:

CITY of FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS		DESCRIPTION	
NO.	DATE	BY	CHK'D

PROJECT # 11880
PUMP STATION REHAB
SANITARY SEWER PUMP STATION A-12
ELECTRICAL LEGEND
900 AVOCADO ISLE

SHEET NO. OF
E-14 14

TOTAL: 34

CAD FILE:
11880–E14–LEGN

DRAWING FILE NO.
4–1371424

15. PROVIDE ADEQUATE CLEARANCE OF PLUG VALVES ABOVE FLOOR SLAB FOR FUTURE MAINTENANCE. COORDINATE WITH CITY STATION MECHANICS.

GENERAL VENTILATION NOTES

1. THE WORD "VENTILATION" MEANS SUPPLY FAN, EXHAUST FAN, DUCT WORK, SUPPLY AND EXHAUST FAN, DUCT WORK, SUPPLY AND EXHAUST GRILL, SMOKE AND FIRE DAMPERS, ETC.
2. ALL WORK SHALL CONFORM WITH ALL LOCAL, STATE, FEDERAL ORDINANCES AND BUILDING CODES GOVERNING THE INSTALLATION OF THE AIR CONDITIONING SYSTEM. IF WORK AS Laid OUT INDICATED OR SPECIFIED IS CONTRARY TO OR CONFLICTS WITH LOCAL ORDINANCES, BUILDING CODES AND REGULATIONS, THE CONTRACTOR SHALL REPORT IN WRITING TO ENGINEER BEFORE SUBMITTING A BID. THE PROJECT MANAGER/ENGINEER WILL THEN ISSUE INSTRUCTIONS AS HOW TO PROCEED.
3. THE DRAWINGS ARE TO BE CONSIDERED DIAGRAMMATIC, NOT NECESSARILY SHOWING IN DETAIL OR TO SCALE ALL OF THE MINOR ITEMS. UNLESS SPECIFIC DIMENSIONS ARE SHOWN, THE STRUCTURAL AND SITE CONDITIONS SHALL GOVERN THE EXACT LOCATIONS. CONTRACTOR SHALL FOLLOW DRAWINGS IN LAYING OUT WORK. CONTRACTOR SHALL VERIFY SPACES IN WHICH WORK WILL BE INSTALLED AND MAINTAIN MAXIMUM HEAD ROOM, AND SPACE CONDITIONS AT ALL POINTS. WHERE HEAD ROOM, OR SPACE CONDITIONS APPEAR INADEQUATE, ENGINEER SHALL BE NOTIFIED BEFORE PROCEEDING WITH INSTALLATION. THIS CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE FIELD MODIFICATION IN LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF VARIOUS TRADES OR FOR PROPER EXECUTION OF THE WORK.
4. EXAMINE ALL DRAWINGS CAREFULLY PRIOR TO SUBMITTING A BID. CONTRACTOR WILL BE REQUIRED TO FURNISH, INSTALL AND/OR CONNECT WITH APPROPRIATE SERVICES ALL AIR CONDITIONING ITEMS SHOWN ON ANY OF THE PLUMBING, ELECTRICAL AND SPRINKLER DRAWINGS WITHOUT ADDITIONAL EXPENSE TO THE CITY. IF DISCREPANCIES, CONFLICTS, INTERFERENCES OR OMISSIONS OCCUR BETWEEN DRAWINGS, NOTIFY IN WRITING THE ENGINEER IN AMPLIE TIME TO PERMIT REVISIONS BEFORE THE BIDS ARE SUBMITTED.
5. INSTALL MATERIALS AND EQUIPMENT IN A NEAT AND FIRST CLASS WORKMANLIKE MANNER. THE CITY RESERVES THE RIGHT TO DIRECT REMOVAL AND REPLACEMENT OF ITEMS WHICH, IN HIS OPINION, DO NOT PRESENT A NEAT AND WORKMANLIKE APPEARANCE. REMOVAL AND REPLACEMENT IS TO BE DONE IMMEDIATELY WHEN DIRECTED BY THE CITY IN WRITING, AT THE SOLE EXPENSE OF THE CONTRACTOR.
6. START OF WORK BY CONTRACTOR SHALL BE CONSIDERED AS ACCEPTANCE BY HIM OF ALL CLAIMS OR QUESTIONS AS TO SUITABILITY OF THE WORK OF OTHER TRADES OR OTHER CONTRACTORS TO RECEIVE HIS WORK. THIS CONTRACTOR SHALL REMOVE AND REPLACE, AT HIS EXPENSE, ALL AIR CONDITIONING WORK WHICH MAY HAVE TO BE REMOVED BECAUSE OF INTERFERENCE WITH OTHER TRADES.

7. THIS CONTRACTOR SHALL OBTAIN AND PAY ALL INSURANCE, FEES, PERMITS, ASSOCIATION DUES, ROYALTIES, AND TAXES OF WHATEVER NATURE SHALL APPLY TO THIS WORK. HE SHALL ALSO PAY ALL INSPECTIONS FEES AS MAY BE REQUIRED BY LAW OR ORDINANCE AND SHALL KEEP THE CITY HARMLESS FROM ANY DAMAGE AND EXPENSE ARISING FROM ANY VIOLATION OF THE LAWS, RULES OR ORDINANCES.

8. EACH TRADE SHALL RUN HIS/HER LINES, PIPES AND EQUIPMENT IN AS EFFICIENT A MANNER AS POSSIBLE CONSERVING AIR CONDITIONING SPACE IN ALL INSTANCES. ALL ITEMS SHALL BE INSTALLED AS TIGHT TO THE ITEMS INSTALLED ABOVE THEM AS POSSIBLE, IN CONSIDERATION OF THE REQUIREMENTS OF SUBSEQUENT TRADES. NO EXCESSIVE CLEARANCE TOLERANCES OR DISORGANIZED INSTALLATION SHALL BE ALLOWED. THE MECHANICAL ENGINEER SHALL HAVE THE FINAL SAY AS TO WHETHER OR NOT A CONFLICT COULD HAVE BEEN AVOIDED BY FOLLOWING MORE EFFICIENT ROUTING OR SUSPENSION THAN THAT USED REGARDLESS OF COSTS OR TIME EMPLOYED BY THE CONTRACTOR.
9. THE STRICT ADHERENCE TO THE ABOVE WILL NECESSITATE ADDITIONAL ELBOWS, BENDS, OFFSETS, RE-ROUTING AND LENGTHS IN EXCESS OF THOSE SHOWN. THESE ARE TO BE INCLUDED IN THE BASE BID AT NO ADDITIONAL COST TO THE CITY.

- COORDINATE DUCTWORK WITH REFLECTED CEILING LAYOUT AND WITH LIGHTING FIXTURES.
- CONTRACTOR TO COORDINATE DUCTWORK LAYOUT WITH STRUCTURAL MEMBERS AND FIELD CONDITIONS.
- CONTRACTOR TO VERIFY FIELD CONDITIONS PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK.

- THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS OF ALL MECHANICAL TRADES. THESE SHALL EVIDENCE COORDINATION BETWEEN THE H.V.A.C., PLUMBING AND FIRE PROTECTION AND THE STRUCTURAL, ARCHITECTURAL AND ELECTRICAL. THE DRAWINGS SHALL BE OF A LARGE ENOUGH SCALE TO ALLOW FOR THE PROPER COORDINATION OF ALL TRADES. ALL LOCATIONS OF POSSIBLE CONFLICT WILL BE CLEARLY NOTED FOR RESOLUTION BY THE ARCHITECT/ENGINEER. ANY ITEMS NOT SHOWN AS POSSIBLE CONFLICTS ON THESE SHOP DRAWINGS WILL BE CONSIDERED TO HAVE BEEN RESOLVED AT NO ADDITIONAL COST BY THE INDIVIDUAL TRADE CONCERNED.

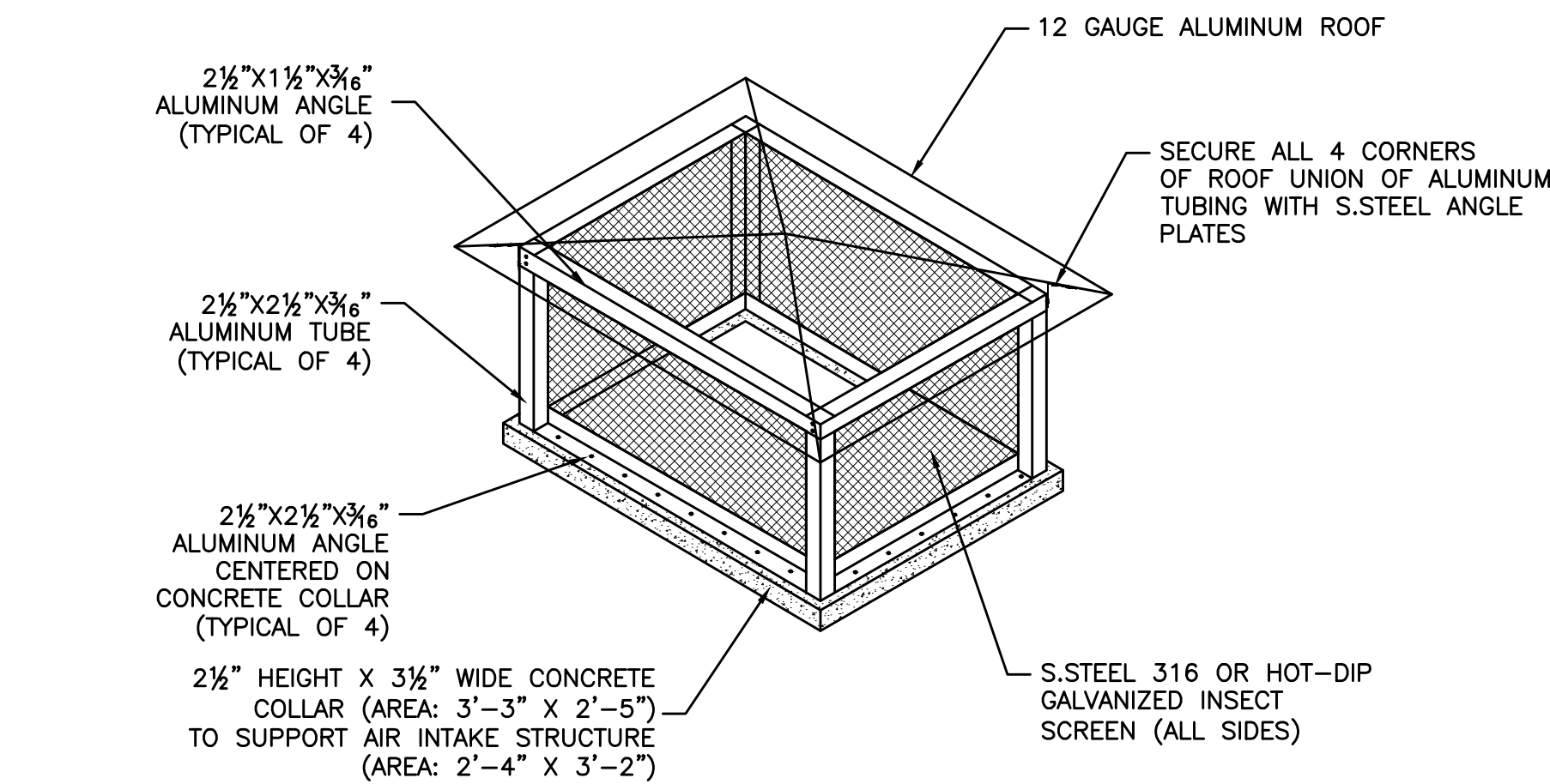
FOR ALL INSTANCES INVOLVING CEILING CLEARANCE, PRIORITIES ARE AS FOLLOWS:

- a. GRAVITY SEWER, RAINWATER, CONDENSATE AND ACID WASH PIPING.
 - b. H.V.A.C. DUCTWORK AND EQUIPMENT.
 - c. FIRE PROTECTION MAINS.
 - d. H.V.A.C. CHILLED WATER LINES.
 - e. FIRE PROTECTION BRANCH LINES.
 - f. PLUMBING PRESSURE PIPES.
 - g. ELECTRICAL.
10. DUCT SMOKE DETECTOR SHALL BE INSTALLED IN SUPPLY AND RETURN DUCT PER S.F.B.C. AND ACCORDING TO THEIR CFM, WHETHER OR NOT THEY ARE INDICATED ON THE PLANS AND SHALL BE WIRED TO SHUT OFF THE UNIT AND CONNECT TO THE FIRE ALARM SYSTEM.
 11. AN INDEPENDENT NEBB CERTIFIED FIRM SHALL TEST AND BALANCE THE SYSTEM TO QUANTITIES ON THE PLAN FOR BOTH AIR AND WATER SYSTEMS. T&B REPORT IN ACCORDANCE WITH NEBB STANDARD PROCEDURES, SIGNED AND SEALED BY SUPERVISOR OF SAID FIRM SHOULD BE SUBMITTED TO ENGINEER FOR APPROVAL.
 12. AT COMPLETION OF JOB, THE HVAC CONTRACTOR SHALL GIVE THE CITY AN AS-BUILT SET OF REPRODUCIBLE AUTOCAD CD SHOWING THE EXACT INSTALLATION.
 13. THE HVAC CONTRACTOR SHALL WARRANT ALL WORKMANSHIP AND MATERIALS FOR ONE YEAR FROM THE DATE OF FINAL WORK ACCEPTANCE BY CITY. ANY BREAKDOWN OCCURRING IN FIRST YEAR SHALL BE REPAIRED AT NO EXPENSE TO THE CITY. THE COMPRESSOR(S) SHALL HAVE A FIVE-YEAR WARRANTY.
 14. MOUNT ALL EQUIPMENT FOR WIND LOADS AND MOUNTING HEIGHTS AS REQUIRED BY LOCAL CODES. SEE STRUCTURAL PLANS.
 15. ALL DUCTWORK ROUTING SHOWN IS DIAGRAMMATIC, NOT EVERY ELBOW, BEND OFFSET OR TAP OFF IS SHOWN. CONTRACTOR SHALL INCLUDE IN HIS/HER BID ALL SUCH ITEMS REQUIRED TO INSTALL HVAC DUCTWORK IN ORDER TO CLEAR STRUCTURAL OR OTHER OBSTRUCTIONS, AND MAINTAINING CEILING HEIGHTS REQUIRED. SUBMIT SHOP DRAWINGS PRIOR TO COMMENCE WORK.
 16. REFRIGERANT LINES ROUTING AS SHOWN IS DIAGRAMMATIC. NOT EVERY ELBOW, BEND OR OFFSET IS SHOWN. CONTRACTOR SHALL INCLUDE IN HIS/HER BID ANY AND ALL SUCH PIPING ELBOWS, BENDS, OFFSETS, VALVES, EXPANSION, FITTINGS, AND APPURTENANCES AS REQUIRED TO ROUTE PIPING TO ALL AIR CONDITIONERS, CLEARING STRUCTURAL OR OTHER OBSTRUCTIONS WHILE MAINTAINING SCHEDULED CEILING HEIGHTS.
 17. ALL DUCT SIZES ARE CLEAN INSIDE DIMENSIONS.
 18. MATERIALS:

- a. MAIN SUPPLY AND RETURN MAIN SUPPLY AND RETURN DUCT SHALL BE SHEET METAL PER LATEST S.M.A.C.N.A. STANDARDS, EXCEPT PLAN CALLS FOR FIBERGLASS. SHEET METAL DUCT MUST BE INSULATED WITH R=6 INSULATION WRAP.
- b. FLEXIBLE DUCTWORK SHALL BE CLASS I AIR DUCT, U.L. LISTED OR APPROVED EQUAL AND R=4.2. INSTALL PER LATEST S.M.A.C.N.A. STANDARDS AND MANUFACTURER'S RECOMMENDATIONS. DUCTWORK SHALL NOT BE COMPRESSED TO OVER 20% OF ITS CROSS SECTIONAL AREA. DUCTWORK IN ATTIC SPACE (UNCONDITIONED AIR SPACE) SHALL BE OF R=8.0 MINIMUM. DUCTWORK BETWEEN CONDITIONED FLOORS AND ABOVE GARAGES SHALL BE OF R=4.2 MINIMUM.
- c. TOILET EXHAUST DUCTWORK SHALL BE OF SPUN ALUMINUM THERMOFAN DUCT INSTALLED IN ACCORDANCE WITH ASHRAE AND MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
- d. ALL AIR DEVICES SHALL BE OF ALUMINUM CONSTRUCTION, TITUS, METALAIR, OR AS APPROVED BY ENGINEER.
- e. CONDENSATE DRAIN-PIPING SHALL BE INSULATED WITH 1/2" THICK ARMAFLEX, PAINTED WHITE WHERE EXPOSED.
- f. CONDENSATE DRAIN LINE MUST HAVE A WATER TRAP OF 3" MINIMUM NEXT TO A/C UNIT.
- g. FILTER SHALL BE DISPOSABLE TYPE AND HAVE CLEAN PRESSURE DROP OF 0.15". PROVIDE TWO (2) SETS, ONE DURING CONSTRUCTION AND ONE FOR USE AFTER OCCUPANCY.

SECTION A-A OF AIR INTAKE

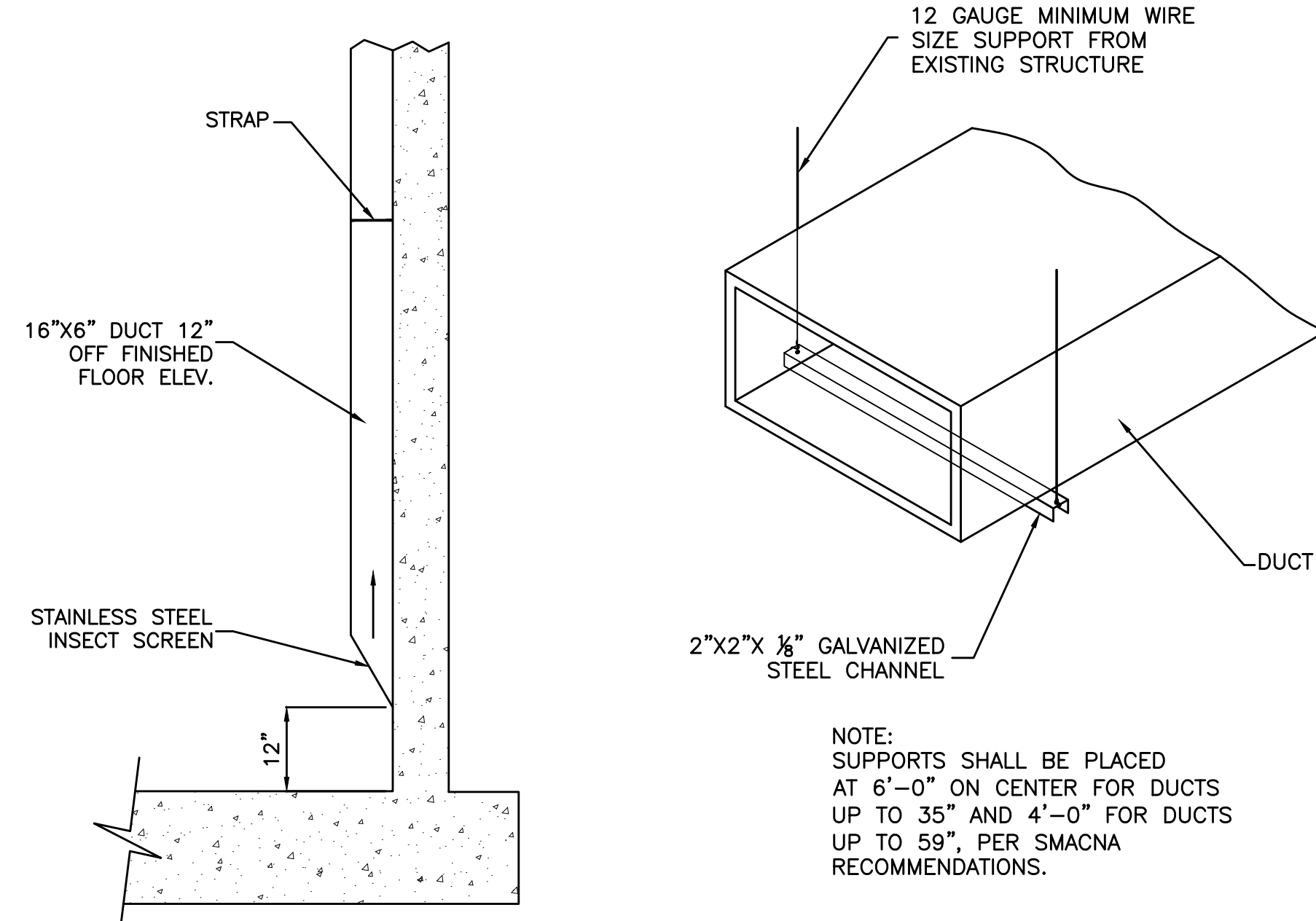
SCALE: 3/8" = 1'-0"



AIR INTAKE STRUCTURE

N.T.S.

*NOTE
ALL DUCT WORK INCLUDING THE OUTSIDE GOOSE NECK, MUST BE STAINLESS STEEL 316. PROVIDE SHOP DRAWING BEFORE FABRICATION.



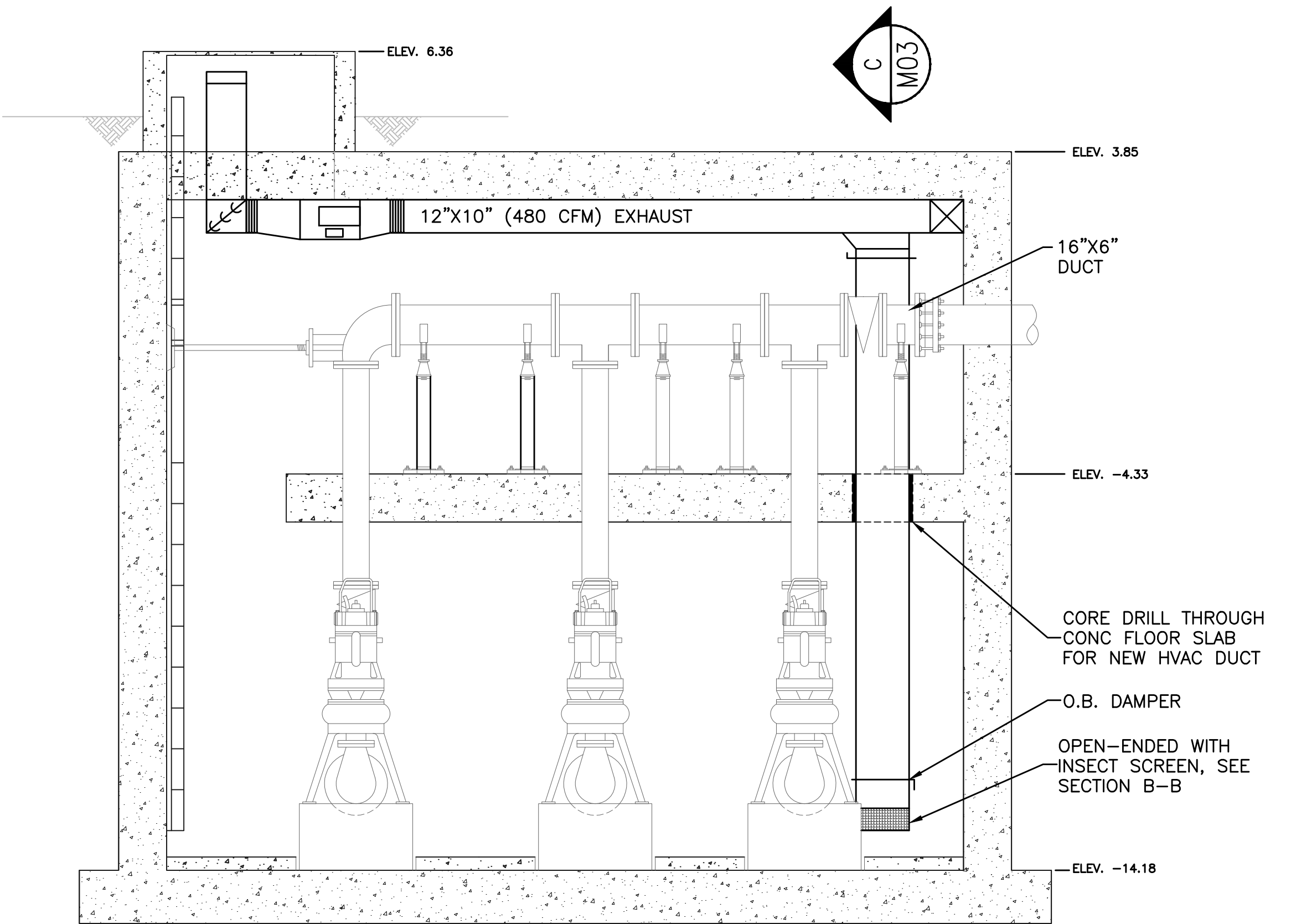
SECTION C-C

N.T.S.

RECTANGULAR DUCT SUPPORT DETAIL

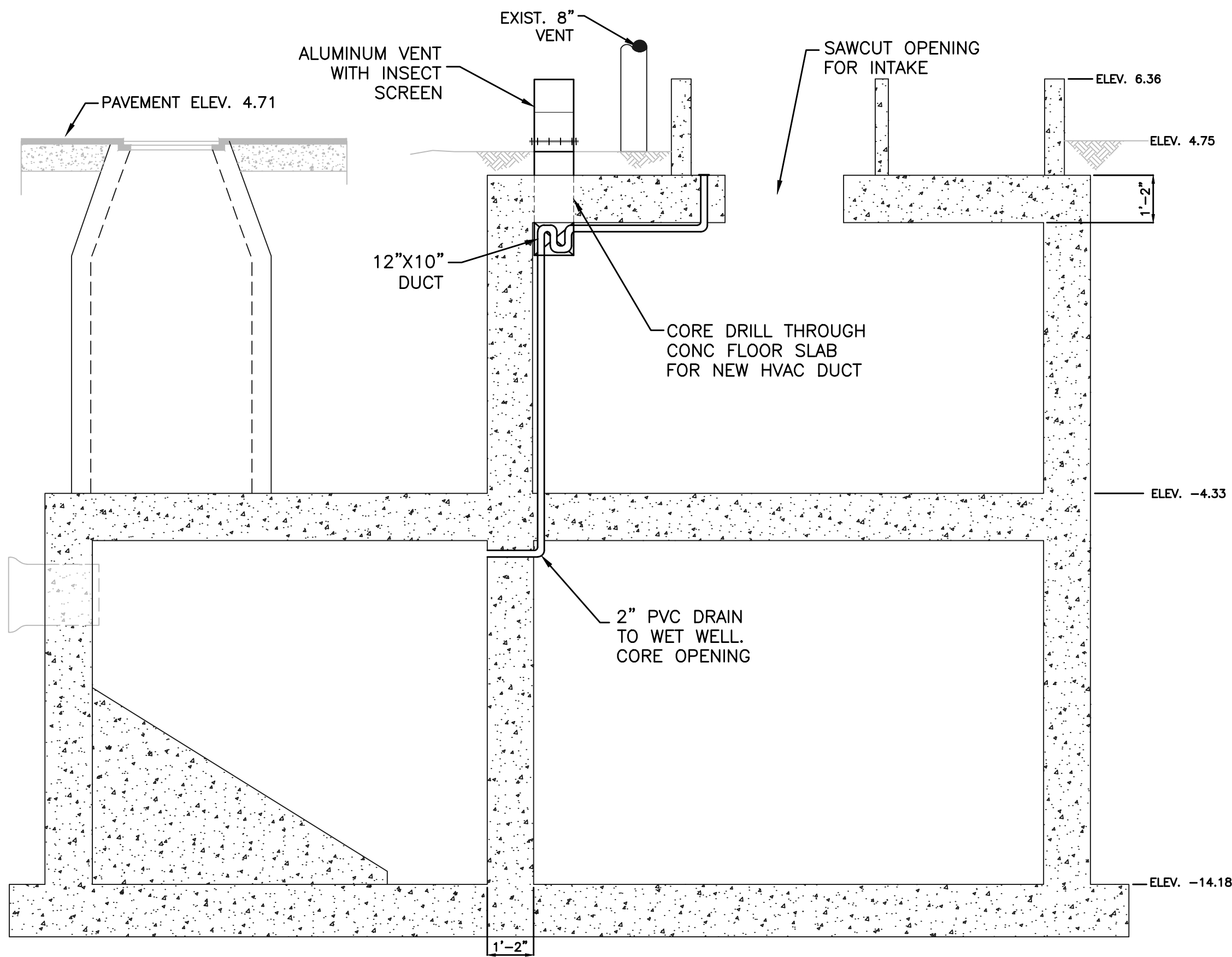
N.T.S.

VENTILATION SECTIONS



NORTH SECTION

3/8" = 1'-0"



SECTION B-B

3/8" = 1'-0"

ELECTRICAL ENGINEER FRED N. MEYER REG. No. 36517 DATE:	TEL: (954) 828-5069 FAX: (954) 828-5074
---	--

DRAWN BY: CMB	DATE: JULY 2016	DESIGNED BY: SCALE: AS NOTED	CHECKED BY: FNM	FIELD BOOK: 33301
---------------	-----------------	------------------------------	-----------------	-------------------

CITY OF FORT LAUDERDALE PUBLIC WORKS DEPARTMENT ENGINEERING & ARCHITECTURE 100 North Andrews Avenue, Fort Lauderdale, Florida 33301
--

REVISIONS	DATE	BY	CHK'D	DESCRIPTION
NO.				

PROJECT # 11880 PUMP STATION REHAB SANITARY SEWER PUMP STATION A-12 VENTILATION PLAN & GENERAL NOTES 900 AVOCADO ISLE

SHEET NO. M-3	OF 3
TOTAL: 31	
CAD FILE: 11880-M01-MULTI	
DRAWING FILE NO. 4-1317-1-1	

BID SET

Question and Answers for Bid #663-11778 - Sanitary Sewer Pump Station A-12 Rehabilitation (P11880)

Overall Bid Questions

There are no questions associated with this bid.

Question Deadline: Aug 19, 2016 5:00:00 PM EDT