Solicitation 12105-283

Pump Stations D-10 & D-11 Flow Analysis and Redesign

Bid Designation: Public

CITY OF FORT LAUDERDALE

City of Fort Lauderdale

Bid 12105-283
Pump Stations D-10 & D-11 Flow Analysis and Redesign

Bid Number	12105-283
Bid Title	Pump Stations D-10 & D-11 Flow Analysis and Redesign
Bid Start Date	Jan 12, 2018 3:31:13 PM EST
Bid End Date	Feb 12, 2018 2:00:00 PM EST
Question & Answer End Date	Feb 1, 2018 5:00:00 PM EST
Bid Contact	Claudia Cristian-Chery Procurement Specialist II Finance cchery@fortlauderdale.gov
Contract Duration	**One Time Purchase**
Contract Renewal	Not Applicable
Prices Good for	**120 days**
Pre-Bid Conference	**Jan 23, 2018 11:00:00 AM EST** **Attendance is optional** **Location: City Hall** **100 North Andrews Avenue** **4th Floor Conference Room** **Fort Lauderdale, FL 33301**

Bid Comments

Sealed bids will be received electronically until 2:00 P.M., local time, on Monday, February 12, 2018 and opened immediately thereafter in the 5th Floor Conference Room, City Hall, City of Fort Lauderdale, Florida, 100 North Andrews Avenue, for BID NO., 12105-283, PROJECT NO., 12202 Pump Stations D-10 & D-11 Flow Analysis and Redesign.

This project consists of Drawing File No. 4-130-21 (33) sheets.

The work includes rehabilitating the City of Fort Lauderdale's sewage pumping Stations D-10 and D-11 and associated waste water system components. The work consists of but not limited to furnishing all labor, material and equipment necessary to: demolish and remove existing structures, piping and equipment; clean, rehabilitate, and paint existing structures; construction of new gravity sanitary sewers, manhole and a valve vault; installation of new submersible sewage pumps, piping, appurtenances; electrical and control systems; and all restoration.

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

Licensing Requirements : Possession of a Certified Underground Utility and Excavation Contractor and General Contractors License is required for this project.

Pre-Bid Meeting/Site visit: - A pre-bid meeting and/or site visit will be held on Tuesday, January 23, 2018 at 11 a.m. local time, at City Hall, 100 N. Andrews Avenue, 4th Floor Conference Room, Fort Lauderdale, Florida.

It is strongly suggested that all Contractors attend the pre-proposal conference and/or 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 location (s)/facilities OR /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/or 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 $25.00 (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, 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.

Item Response Form

Item	**12105-283--01-01 -** Base Bid 1: Mobilization (60%)/Demobilization (40%), Bonds and **Insurance**
Lot Description	Base Bid 1
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
Payment for mobilization and demobilization includes, but is not limited to, bonds, insurance, transport of personnel, materials, equipment, and other incidentals to the site, all notifications to public including but not limited to flyers and other notifications, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs meeting City standards, field surveys, sanitary and other facilities required by the specifications, audio'video documentation of the existing site, any space required for staging laydown, survey, storage, parking, security, etc., and all other activities necessary for complete mobilization/demobilization requirement for the contract.

Item	**12105-283--02-01 -** Base Bid 2: Project Record Documents

Lot Description	Base Bid 2
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
Payment for furnishing all labor, materials, and equipment necessary to coordinate, prepare and create the Project Record Drawings

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Item	**12105-283--03-01 -** Base Bid 3: Maintenance of Traffic (MOT)
Lot Description	Base Bid 3
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
Payment for all labor, equipment and materials for the design and preparation of signed and sealed MOT plans by a Florida Professional Engineer

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Item	**12105-283--04-01 -** Base Bid 4: Construction of Isle of Venice Pump Station D10 **Improvements**
Lot Description	Base Bid 4
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
Payment for all labor, equipment, material, testing, permits, and appurtenances for all work necessary and required for the Pump Station D10 Improvements including all site, structural, piping, and mechanical demolition, and electrical improvements required to complete the work as specified, excluding bid items listed elsewhere

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Item	**12105-283--05-01 -** Base Bid 5: Construction of Hendricks Isle Pum Stat D11 Improvements
Lot Description	Base Bid 5
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
Payment for all labor, equipment, material, testing, permits, and appurtenances for all work necessary and required for the Pump Station D10 Improvements including all site, structural, piping, and mechanical demolition, and electrical improvements required to complete the work as specified, excluding bid items listed elsewhere

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Item	**12105-283--06-01 -** Base Bid 6: Furnish and Install 8**-inch SR 26 PVC**
Lot Description	Base Bid 6
Quantity	**120 linear foot**
Unit Price	
Delivery Location	**City of Fort Lauderdale** See ITB Specifications See ITB Specifications Fort Lauderdale FL 33301 **Qty** 120

Description
Payment for all labor, equipment, testing and material for all work necessary and required for the installation the SDR 26 gravity sewer

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Item	**12105-283--07-01 -** Base Bid 7: Wet Well and Valve Vault Cleaning and Preparation
Lot Description	Base Bid 7
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
Payment to clean and prepare the wet wells and valve vaults for Pump Stations D10 and D11 prior to all rehabilitation work and coatings

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Item	**12105-283--08-01 -** Base Bid 8: Concrete Rehabiliation
Lot Description	Base Bid 8
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
Payment for all labor, equipment and material for all work necessary and required for the Concrete Rehabilitation in manholes, wet wells, valve vaults etc.

Item	**12105-283--09-01 -** Base Bid 9: All fittings and piping painted on the exterior and in the **valve box**
Lot Description	Base Bid 9

Quantity **150 square foot**

Unit Price

Delivery Location **City of Fort Lauderdale**

See ITB Specifications
See ITB Specifications
Fort Lauderdale FL 33301
Qty 150

Description
Payment to paint the exterior fittings and pipes within the valve vault

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Item **12105-283--10-01 -** Base Bid 10: Final certified interior manhole and wet well inspections

Lot Description Base Bid 10

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
Payment for all labor, equipment and material for all work necessary and required for the final certification of the interior of manholes and wet wells

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Item **12105-283--11-01 -** Base Bid 11: Bypass pumping

Lot Description Base Bid 11

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
Payment all labor, equipment and material for all work necessary and required for bypass pumping operations

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Item **12105-283--12-01 -** Base Bid 12: Manhole rehabiliation

Lot Description Base Bid 12

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
Payment to rehabilitate existing manhole

Item	**12105-283--13-01 -** Base Bid 13: New Manhole
Lot Description	Base Bid 13
Quantity	**3 each**
Unit Price	
Delivery Location	**City of Fort Lauderdale** See ITB Specifications See ITB Specifications Fort Lauderdale FL 33301 **Qty** 3

Description
Payment to furnish and install new manholes as shown in the plans with traffic rated covers, concrete collars, re'benching of the existing manhole flow channels, new manhole benching flow channels, and all coatings.

Item	**12105-283--14-01 -** Base Bid 14: Replace Pumps
Lot Description	Base Bid 14
Quantity	**4 each**
Unit Price	
Delivery Location	**City of Fort Lauderdale** See ITB Specifications See ITB Specifications Fort Lauderdale FL 33301 **Qty** 4

Description
Payment to furnish and install new submersible pumps, appurtenances, testing and training.

Item	**12105-283--15-01 -** Base Bid 15: Eletrical Improvements
Lot Description	Base Bid 15
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
Payment for the removal of existing equipment, and purchase and installation of electrical equipment for pump stations D10 and D11.

Item	**12105-283--16-01 -** Base Bid 16: CCTV of 1,500 Linear Feet of Gravity Sewer
Lot Description	Base Bid 16
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

Payment to peform CCTV of gravity sewers and laterals along the Isle of Venice and Hendicks isle

CITY OF FORT LAUDERDALE
CONTRACT AND SPECIFICATIONS PACKAGE

BID NO. 12105-283

PROJECT NO. 12202

PROJECT NAME
Pump Stations D-10 & D-11 Flow Analysis and Redesign

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

DANIEL FISHER, P.E.
PROJECT MANAGER II

CLAUDIA CRISTIAN-CHERY
PROCUREMENT SPECIALIST II
Telephone: (954) 828-5143 E-mail: cchery@fortlauderdale.gov

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02222 Excavation and Backfill for Utilities and Structures
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02260 Finish Grading
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02500 Landscaping
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APPENDICES

Appendix A Geotechnical Report
Appendix B Permits Obtained by Owner
Appendix C Approved Manufacturers List
Appendix D Protecto 401 Piping and Fitting Coating Information

Note: The following documents are available electronically for completion and documents must be returned with your bid along with your bid security, proof of insurance, and proof of required licenses/certification.

CITB Non-Collusion
CITB Contract Payment Method
CITB Prime Contractor ID
CITB Questionnaire Sheets

CITB Trench Safety
Non-Discrimination Certification
CITB Construction Bid Certification

INVITATION TO BID

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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/departments/finance/procurement-services. For general inquiries, please call (954) 828-5933.

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.

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

services, and shall provide the City prices on such additional items or services. 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 – Procurement Manager, 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.

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.

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.

The term “Minority Business Enterprise” means a business at least fifty-one percent (51%) of which is owned by minority group members or, in the case of a publicly owned business, at least fifty-one percent (51%) 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.

LOBBYING ACTIVITIES - ALL CONTRACTORS PLEASE NOTE: Any contractor submitting a response to this solicitation must comply, if applicable, with City of Fort Lauderdale Ordinance No. C-00-27 & Resolution No. 07-101, Lobbying Activities. Copies of Ordinance No., C-00-27, and Resolution No. 07-101, may be obtained from the City Clerk’s Office on the 7th Floor of City Hall, 100 N. Andrews Avenue, Fort Lauderdale, Florida. The ordinance may also be viewed on the City's website at http://www.fortlauderdale.gov/clerk/LobbyistDocs/lobbyist_ordinance.pdf .

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 construction 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 **Claudia Chery, Procurement Specialist II,** at (954) 828-5143 or email at cchery@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 questions and answers submitted in BidSync shall become part of any contract that is created from this ITB.

05. 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 **150** 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 **180** 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.

07. REQUIRED LICENSES/CERTIFICATIONS

Contractor must possess the following licenses/certifications to be considered for award.
Certified Underground Utility and Excavation Contractor
General Contractors License

Note: Contractor must have proper licensing and be able to provide evidence of same, if requested, at time of award.

08. SPECIFIC EXPERIENCE REQUIRED

The following expertise is required to be considered for this contract. Specific references attesting to this expertise must be submitted with bid.

Contractor must have experience in the construction of sewage pumping stations. Bidder shall submit, with the offer, written evidence of its qualifications and ability to begin construction, to perform in a satisfactory manner, and to complete all of the work covered by the Contract within the time specified in the Solicitation.

REFERENCES SHOULD NOT INCLUDE CITY OF FORT LAUDERDALE EMPLOYEES OR WORK PERFORMED FOR THE CITY.

By signing this bid solicitation, contractor is affirming that this expertise will be provided for this contract at no additional charge.

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	**$**
Tree Allowance	$30,000
Permitting, Licensing, and Fees Allowance	$5,000
CIPP Lining and Repair of Sanitary Sewers Along Isle of Venice and Hendricks Isle	$200,000
TOTAL	**$235,000**

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

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.

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 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

10.3 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

10.4 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.

10.5 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.

10.6 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__

12. CITY PROJECT MANAGER
The Project Manager is hereby designated by the City as **Daniel Fisher, P.E.** whose address is **100 North Andrews, 4th Floor, Fort Lauderdale, FL 33301**, telephone number: **(954) 828-5850**, and email address is DFisher@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 **Five Hundred Dollars ($500.00)** 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 SCHEDULE (including overtime hours): Monday-Friday, 8:00 am – 5:00 pm
Regular work hours: **8:00 am to 5:00 pm, Monday through Friday.**
City Inspector Hours: **8:00 am to 4:30 pm, Monday through Friday.**

Any inspection requested by the contractor outside those hours will be considered overtime to be paid by the Contractor.

16. INSPECTION OVERTIME COST: $ 90/hr

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., 12105-283, Project Number, 12202, 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 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:

Pump Stations D-10 & D-11 Flow Analysis and Redesign
ITB 12105-283 PROJECT 12202

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 consists of rehabilitating the City of Fort Lauderdale's sewage pumping Stations D-10 and D-11 and associated waste water system components. The work consists of but not limited to furnishing all labor, material and equipment necessary to: demolish and remove existing structures, piping and equipment; clean, rehabilitate, and paint existing structures; construction of new gravity sanitary sewers, manhole and a valve vault; installation of new submersible sewage pumps, piping, appurtenances; electrical and control systems; and all restoration.

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 **Daniel Fisher, P.E.** whose address is **100 North Andrews, 4th Floor, Fort Lauderdale, FL 33301**, telephone number: **(954) 828-5850**, and email address is DFisher@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.

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 **150** 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 **180** 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. Contractor has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

8.6 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.

8.7 Labor

8.7.1 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.

8.7.2 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.

8.7.3 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.

8.7.4 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.

8.8 Materials:

8.8.1 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.

8.8.2 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.

8.9 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. 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.

8.10 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.

8.11 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.

8.12 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.

8.13 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.

8.14 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 of 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 of each work day, 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.

8.15 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:

8.15.1 Flow of material and equipment from suppliers.
8.15.2 The interrelated work with affected utility companies.

8.15.3 The interrelated work with the City where tie-ins to existing facilities are required.
8.15.4 The effort of independent testing agencies.
8.15.5 Notice to affected property owners as may be directed by the Project Manager.

8.16 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 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.

8.17 Safety and Protection:

8.17.1 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:

8.17.1.1 All employees working on the project and other persons who may be affected thereby.
8.17.1.2 All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site.
8.17.1.3 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.

8.17.2 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.

8.18 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 entitles claiming by, through or under the Contractor, releases and discharges 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, undue, 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; 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 date 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 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): The Contractor shall purchase and maintain property insurance upon the Work at or off the site of 100% of the contract completed value. These policies shall insure the interest of the owner, contractor and subcontractors in the Work, and shall insure against "all risks" of physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage. All such insurance required by this paragraph shall remain in effect until the Work is completed and accepted by the City.

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

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 AND NAME MUST APPEAR ON EACH CERTIFICATE, AND THE CITY OF FORT LAUDERDALE MUST BE NAMES ON THE CERTIFICATE AS AN "ADDITIONAL INSURED".

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 trails 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 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, expediters, 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 **One Thousand Dollars ($1,000)** 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 thirty (30) 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 Contactor 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 additional 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 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. 2013), with regard to the "Cuba Amendment," 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 or the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2016), that it is not engaged in a boycott of Israel, and that it does not have business operations in Cuba or Syria, as provided in section 287.135, Florida Statutes (2016), as may be amended or revised. The City may terminate this Agreement 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 (2016), 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 the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2016), or is engaged in a boycott of Israel or has been engaged in business operations in Cuba or Syria, as defined in Section 287.135, Florida Statutes (2016), as may be amended or revised.

22.8 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.

22.9 Attorney Fees: If CITY or CONSULTANT incurs any expenses in enforcing the terms of this Agreement through litigation, the prevailing party in that litigation shall be reimbursed for all such costs and expenses, including but not limited to court costs, and reasonable attorney fees incurred during litigation.

22.10 Public Records

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT PRRCONTRACT@FORTLAUDERDALE.GOV, 954-828-5002, CITY CLERK'S OFFICE, 100 N. ANDREWS AVENUE, FORT LAUDERDALE, FLORIDA 33301.

Contractor shall:

1. Keep and maintain public records that ordinarily and necessarily would be required by the City in order to perform the service.

2. Upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes (2017), as may be amended or revised, or as otherwise provided by law.

3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of this contract if the Contractor does not transfer the records to the City.

4. Upon completion of the Contract, transfer, at no cost, to the City all public records in possession of the Contractor or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of this Contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of this Contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

PUBLIC WORKS OFFICE RENOVATIONS
PROJECT P17-08

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 _____, 2017, 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

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, conflictions, 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 aide 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 City's Public Works Department, Broward County, Florida Department of Transportation, as applicable, 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. 2013), with regard to the "Cuba Amendment," 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 or the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2016), that it is not engaged in a boycott of Israel, and that it does not have business operations in Cuba or Syria, as provided in section 287.135, Florida Statutes (2016), as may be amended or revised. The City may terminate this Agreement 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 (2016), 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 the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2016), or is engaged in a boycott of Israel or has been engaged in business operations in Cuba or Syria, as defined in Section 287.135, Florida Statutes (2016), 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/TRADE SECRETS/COPYRIGHT: The Proposer's response to the Solicitation is a public record pursuant to Florida law, which is subject to disclosure by the City under the State of Florida Public Records Law, Florida Statutes Chapter 119.07 ("Public Records Law"). The City shall permit public access to all documents, papers, letters or other material submitted in connection with this Solicitation and the Contract to be executed for this Solicitation, subject to the provisions of Chapter 119.07 of the Florida Statutes.

Any language contained in the Proposer's response to the Solicitation purporting to require confidentiality of any portion of the Proposer's response to the Solicitation, except to the extent that certain information is in the City's opinion a Trade Secret pursuant to Florida law, shall be void. If a Proposer submits any documents or other information to the City which the Proposer

claims is Trade Secret information and exempt from Florida Statutes Chapter 119.07 ("Public Records Laws"), the Proposer shall clearly designate that it is a Trade Secret and that it is asserting that the document or information is exempt. The Proposer must specifically identify the exemption being claimed under Florida Statutes 119.07. The City shall be the final arbiter of whether any information contained in the Proposer's response to the Solicitation constitutes a Trade Secret. The City's determination of whether an exemption applies shall be final, and the proposer agrees to defend, indemnify, and hold harmless the City and the City's officers, employees, and agent, against any loss or damages incurred by any person or entity as a result of the City's treatment of records as public records. Proposals purporting to be subject to copyright protection in full or in part will be rejected.

EXCEPT FOR CLEARLY MARKED PORTIONS THAT ARE BONA FIDE TRADE SECRETS PURSUANT TO FLORIDA LAW, DO NOT MARK YOUR RESPONSE TO THE SOLICITATION AS PROPRIETARY OR CONFIDENTIAL. DO NOT MARK YOUR RESPONSE TO THE SOLICITATION OR ANY PART THEREOF AS COPYRIGHTED.

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:

Telephone Number: **(954) 828-5002**

Mailing Address: **City Clerk's Office**
100 N. Andrews Avenue
Fort Lauderdale, FL 33301

E-mail: **prrcontract@fortlauderdale.gov**

Contractor shall:

1. Keep and maintain public records that ordinarily and necessarily would be required by the City in order to perform the service.

2. Upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes (2016), as may be amended or revised, or as otherwise provided by law.

3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of this contract if the Contractor does not transfer the records to the City.

4. Upon completion of the Contract, transfer, at no cost, to the City all public records in possession of the Contractor or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of this Contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure

requirements. If the Contractor keeps and maintains public records upon completion of this Contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

TETRA TECH

PROJECT MANUAL

CITY OF FORT LAUDERDALE
PUMP STATIONS D-10 & D-11 FLOW ANALYSIS AND REDESIGN

BID SET – NOT FOR CONSTRUCTION

January 2018

Prepared For:

Prepared By:

Tetra Tech
450 N. Park Road, Suite 502
Hollywood, Florida 33021
C.A. No. 2429

Tt #200-78549-16004

PROJECT MANUAL

CITY OF FORT LAUDERDALE
PUMP STATIONS D-10 & D-11 FLOW ANALYSIS AND REDESIGN

Portion of Engineering Documents for Which Responsible	Name and License Number	Company Name, Address, and Business No.	Signature, Seal, and Date
Civil	Janine Alexander, PE FL Lic. No. 71506	Tetra Tech, Inc. 450 N. Park Rd., Suite 502 Hollywood, FL 33021 C.A. No. 2429	
Electrical	Banks Wason, PE FL Lic. No. 73973	Tetra Tech, Inc. 201 E. Pine St., Suite 1000 Orlando, FL 32801 C.A. No. 2429	
Structural	Jason Lee Burkett, PE FL Lic. No. 69879	Tetra Tech, Inc. 201 E. Pine St., Suite 1000 Orlando, FL 32801 C.A. No. 2429	

CITY OF FORT LAUDERDALE
PROJECT No. 12202
PUMP STATIONS D-10 & D-11 FLOW ANALYSIS AND REDESIGN

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SECTION 00301

CITY OF FORT LAUDERDALE
PROPOSAL BID FORM

If this Proposal is accepted, the undersigned Bidder agrees to complete all work under this contract within **180** calendar days (substantial completion) following the issuance of the Notice to Proceed. **UNIT PRICE PREVAILS OVER TOTAL PRICE.** All entries on this form must be typed or written in block form in ink. Quantities provided are for information purposes.

BASE BID

No.	Description	Quantity	Unit	Unit Price	Total
1.0	Mobilization (60%)/Demobilization (40%), Bonds and Insurance	1	LS		
2.0	Project Record Documents	1	LS		
3.0	Maintenance of Traffic (MOT)	1	LS		
4.0	Construction of Isle of Venice Pump Station D10 Improvements	1	LS		
5.0	Construction of Hendricks Isle Pump Station D11 Improvements	1	LS		
6.0	Furnish and Install 8-inch SR 26 PVC	151	LF		
7.0	Wet Well and Valve Vault Cleaning and Preparation	1	LS		
8.0	Concrete Rehabilitation	1	LS		
9.0	Fittings and piping painted on the exterior in the valve box	150	SF		
10.0	Final certified interior manhole and wet well inspections	1	LS		
11.0	Bypass Pumping	1	LS		
12.0	Manhole Rehabilitation	1	LS		
13.0	New Manhole	3	EA		
14.0	Replace Pumps	4	EA		
15.0	Electrical Improvements	1	LS		
16.0	CCTV for the Gravity Sewer	1	LS		

SECTION 00301

CITY OF FORT LAUDERDALE
PROPOSAL BID FORM

TOTAL BID IN WRITING _____

_____

NOTES:

1. **REFER TO SECTION 01025 FOR ADDITIONAL DESCRIPTION OF ITEMS.**
2. **SUBSTANTIAL COMPLETION TIME AND PROJECT CLOSEOUT TIME FOR THE CONTRACT SHALL BE AS DEFINED IN THE PROJECT SCHEDULE IN THE SUPPLEMENTARY GENERAL CONDITIONS.**
3. **THE CONTRACT SHALL BE BASED UPON THE TOTAL BASE BID FOR ITEMS 1 THROUGH 19.**

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SECTION 01005

INTENT OF DRAWINGS AND SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL

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 City 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 City, 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 City.

D. Drawings are diagrammatic and indicate the general arrangement of systems and work indicated (do not scale the drawings). Consult the City or Engineer for exact locations of fixtures, appurtenances, etc., where these items are not definitely located on the drawings.

E. The City'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.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This Contract is for the City of Fort Lauderdale's (City's) Pump Stations D-10 and D-11 rehabilitation and associated wastewater system improvements as specified herein. The Work consists of furnishing all labor, equipment, and materials for the construction of the facilities consisting of, but not limited to, the following:

- D-10: Construction generally includes the removal and replacement of existing 8-inch gravity sewer piping, new manholes and associated wastewater infrastructure. The wastewater piping construction will utilize the open trench method of construction. Pump Station D-10, located at Isle of Venice, will be rehabilitated with new pumps, new hatches, concrete rehabilitation, interior coating of the wetwell and valve vault, new discharge piping fittings and valves, control panel and electrical system upgrades and associated modifications. See plans for detailed project specifics.

- D-11: Construction generally includes the removal and replacement of existing 8-inch gravity sewer piping, new manholes and associated wastewater infrastructure. The wastewater piping construction will utilize the open trench method of construction. Pump Station D-11, located at Hendricks Isle, will be rehabilitated with new pumps, new hatches, a new valve vault, concrete rehabilitation, interior coating of the wetwell and valve vault, new discharge piping fittings and valves, control panel and electrical system upgrades and associated modifications. See plans for detailed project specifics.

1.02 PROJECT SEQUENCE (See also Section 01520)

A. The Contractor shall establish his work sequence based on the use of crews to facilitate completion of construction and testing within the specified Contract Time. The proposed project sequence, including Contractor's plans for provision of temporary facilities, shall be submitted to the Engineer prior to construction.

B. The existing lift stations within the project corridor are critical to providing wastewater transmission for the City's system. Bypass pumping, wastewater flow control and phasing of construction will be required to be provided by the Contractor in order to maintain wastewater service to customers at all times and to avoid the potential of wastewater flow discharges. The Contractor shall prepare and submit a detailed bypass plan and a detailed phasing plan addressing each connection to the City's existing system and a plan for maintaining service. In addition, any planned outages must be included in the phasing plan and coordinated with City staff/operations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01014

CONSTRUCTION SEQUENCING

PART 1 - GENERAL

1.01 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands, excessive back-up or blockage of sewer, excessive noise, or undue traffic disruption.

B. All roadway open-cuts shall be backfilled and compacted the same working day as trenching operations are undertaken. Pavement restoration of roadway open-cuts are to be in accordance with local authorities or no later than seventy two (72) hours after utility installation is completed.

C. No extra charge may be made for time lost due to work stoppage resulting from the creation or avoidance of a public nuisance.

1.02 JURISDICTIONAL DISPUTES

A. It shall be the responsibility of the Contractor to pay all costs that may be required to perform any of the work shown on the Drawings or specified herein in order to avoid any work stoppages due to jurisdictional disputes. The basis for subletting work in question, if any, shall conform with precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, latest edition.

1.03 SEQUENCE OF WORK

A. The Contractor shall establish his work sequencing based on the use of crews to facilitate completion of construction and testing within the specified contract time. The Contractor shall submit detailed sequence of proposed construction along with the project schedule as required in Sections 01310 and 02050.

B. Prior to commencement of work on-site, Contractor shall furnish sequence of work and proposed access methods to the City for review and approval.

1.04 CONTRACTOR'S USE OF PREMISES

A. The Contractor shall assume full responsibility for the protection and safekeeping of all equipment, products and materials. Storage and work areas are the responsibility of the Contractor and they shall be obtained by the Contractor at no cost to the Owner.

1.05 ACCESS

A. Contractor must maintain vehicular and pedestrian access throughout duration of project.

B. Contractor shall at all times maintain access ways for City vehicles and personal to maintain the pump stations or wastewater system as needed.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION

SECTION 01015

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for miscellaneous provisions applicable to the Work.

1.02 RELATED SECTIONS

A. Section 01010 – Special Project Procedures

B. Section 01070 – Applicable Standards

C. Section 01310 – Construction Progress Schedule

D. Section 01340 – Shop Drawings

E. Section 01530 – Protection of Existing Facilities

F. Section 01570 – Traffic Regulation and Maintenance of Traffic

G. Section 01720 – Project Record Documents

H. Other Sections as applicable.

1.03 TERMINOLOGY

A. Throughout the Contract Documents, the following definitions apply:

1. Owner - The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

2. Work - The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

1.04 SAFETY

A. All work shall be done in a safe manner and in strict compliance with all requirements of the Federal Occupational Safety and Health Act (OSHA), The Florida Trench Safety Act and all other State and local safety and health regulations.

B. The Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due. Failure of the Owner to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibilities.

C. The Contractor shall provide, erect, and maintain as necessary, strong, and suitable barricades, danger signs and warning lights for the protection of the public in accordance with Section 01570 – Traffic Regulation and Maintenance of Traffic.

1.05 APPLICABLE CODES

A. The Contractor shall comply with the applicable standards codes and specifications governing the Contract Documents whether City, County, State or Federal. The Contractor is obligated to notify the Owner and Engineer of any deficiency contained in the Contract Documents immediately upon discovery. Where conflicts exist in such, the more stringent shall govern.

1.06 APPLICABLE PERMITS AND LICENSES

A. The Contractor shall abide by all permit conditions, whether, general, specific, limited, or otherwise. A copy of all applicable permits and licenses, with the exception of City permits obtained by the Contractor, are attached hereto and made a part of the Contract Documents.

1.07 PUBLIC BID DISCLOSURE ACT 218.80 FS

A. All the local governmental entity permits or fees are to be disclosed, including, but not limited to, all license fees, permit fees, impact fees, or inspection fees, payable by the contractor to the unit of government that issued the bidding documents or other governmental agency,

B. The following permits are required by the Contractor for this project: City of Fort Lauderdale Public Works and Engineering Department and City of Fort Lauderdale Building Department.

C. Should the Contractor determine dewatering is necessary for the means and methods of construction, it shall be the Contractor's responsibility to submit permit applications to SFWMD and BCEPGMD. A signed and sealed (by a State of Florida licensed engineer) dewatering application would be required. Given the close proximity of this project to a known contamination site, all groundwater monitoring and reporting, as required by the applicable permitting agencies, shall be the responsibility of the Contractor along with any associated costs.

D. The cost for obtaining non-City permits is accounted for in the Permitting Allowance. All City permit fees will be paid for by the City. Actual work required to comply with the dewatering and contamination requirements is accounted for in the Contamination Allowance.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION RESPONSIBILITIES

A. Upon receipt of the Notice To Proceed, the Contractor shall arrange for a Pre-Construction meeting. The meeting shall be held with a minimum of one weeks' notice and shall include the Engineer, the Owner, and Representatives for all affected utility companies.

3.02 TEMPORARY UTILITIES

A. The Contractor shall be responsible to arrange for and supply all temporary utilities including, but not limited to, water, sewer, and electricity.

B. The cost of temporary utilities shall be considered incidental to the cost of the Work

and is therefore included in the Bid.

3.03 UNDERGROUND LOCATING SERVICE

A. Prior to underground construction, the Contractor is required by the Underground Facility Damage Prevention and Safety Act, Chapter 556 FS to contact Sunshine 811, for the location of underground utilities.

3.04 HURRICANE PREPAREDNESS PLAN

A. Should the performance of the Work occur during Hurricane Season, within thirty days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures that the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning. The plan shall detail these measures with specific action items defining responsible personnel.

3.05 INCLEMENT WEATHER

A. In the event of inclement weather, or whenever Engineer shall direct; Contractor will cause Subcontractors to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of Work or materials shall have been damaged or injured by reason of failure on the part of Contractor or any Subcontractor to so protect the Work, such Work and materials shall be removed and replaced at the expense of the Contractor.

3.06 PRESERVATION AND RESTORATION

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this project. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

3.07 PROTECTION OF WORK AND MATERIAL

A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Owner and Engineer.

3.08 CONTRACTOR USE OF PREMISES

A. Contractor shall have limited use of the premises for construction operations, including limited use of the site. The Contractor's use of the premises is further limited to the Owner's right to perform construction operations with its own forces or to employ separate Contractors on portions of the project.

B. The Contractor shall be responsible for coordinating his daily activities in conjunction with any Contractors presently working within the vicinity of this project.

C. Confine operations to areas within rights-of-way and easements.

D. Keep existing driveways and entrances serving the premises clear and available to the Owner, Residents and the Owner's employees at all times.

1. Do not use these areas for parking or storage of materials.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

3.09 ENVIRONMENTAL PROTECTION

A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result.

3.10 ADJUSTMENT OF EXISTING UTILITIES

A. The Contractor shall raise or lower all manholes, valve boxes, etc. to finished grade. The cost of these adjustments shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.11 EXISTING IRRIGATION

A. All existing irrigation systems within the area of the Work shall be restored to original condition or better and adjusted to finished grade. The cost of repairs and/or adjustment to existing irrigation shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.12 DEMOLITION

A. Limits of demolition which may be shown in the Contract Documents are general in nature. Actual limits of demolition shall be as determined by the field conditions in conformance with the requirements of the Work.

B. All sidewalks within the limits of construction which are not ADA compliant (cross-slopes which exceed 2% and/or running slopes which exceed 5% and/or changes in level of ¼" or greater) shall be demolished and reconstructed to meet these requirements.

C. When sidewalk tie-ins exist outside the limits of construction which are not ADA compliant, the Contractor shall replace those sections as directed by the Owner.

END OF SECTION

SECTION 01021

OWNER CONTINGENCY ALLOWANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for administrative procedures for the Contractors utilization of monetary amounts for Owner contingency allowances when contained in the Contract Price or Total Base Bid.

B. The Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

C. The Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. All Owner contingency allowances which remain unused, in whole or in part, remain the property of the Owner.

1.02 RELATED SECTIONS

A. Section 01025 – Basis of Payment

B. Section 01310 – Construction Progress Schedules.

C. Section 01340 – Shop Drawings

D. Other Sections as Applicable.

1.03 SCHEDULE OF ALLOWANCES

A. $5,000 for Permitting, Licensing, and Fees Allowance.

B. $30,000 for Tree Allowance.

C. $200,000 for CIPP Lining and Repair of Sanitary Sewers along Isle of Venice and Hendricks Isle

1.04 ALLOWANCE ITEMS

A. Permitting, Licensing, and Fees Allowance: The allowance indicated for this item is to pay for all non-City permits, licenses and other fees and costs, excluding bid items listed elsewhere, as stated herein which are required of the Contractor to submit for and obtain from various agencies having jurisdiction for construction of the project. All City permits will be paid for by the City. The allowance shown in the Section 1.04 is an estimate of fees required. Payment will be based on the actual permit, license or fee paid directly to agency, documented by paid receipts, specifically excluding any labor, mark-up, overhead and profit, administration and other costs involved in obtaining permits or licenses or paying fees. The Contractor is responsible for submitting and obtaining all necessary regulatory agency permits other than those provided by the Owner and the Contractor is responsible for paying for all associated permit fees which are specifically excluded from this allowance and to be included in the various bid items herein. Fees specifically excluded from this allowance, include but are not limited to, reinspection fees, expired permit fees stand by time, failed test and bacteriological testing fees. The City reserves the right to award any, all, or none

of the money associated with this allowance. Only permit fees substantiated by the Contractor and approved by the Engineer will be paid as part of this Item. Any balance in this Item at the end of the Project shall be credited back to the Owner.

B. Tree Allowance: Measurement for payment to remove and replace various trees within the project limits per the specifications of the Contract Documents. Payment will be made at the unit price included in Section 1.03 and shall constitute full compensation for all labor, material, equipment, and services required for root pruning, storage, etc. and the like for successful replacement to the City's satisfaction for the trees installed and accepted by the Engineer and City; monies deemed by the City to be not needed will remain with the City. Any use of the allowance is at the sole discretion of the City and the City may choose to use a portion or none of the allowance.

C. CIPP Lining and Repair of Sanitary Sewers along Isle of Venice and Hendricks Isle: Measurement for payment to furnish and install CIPP lining and repair of sanitary sewers along Isle of Venice and Hendricks Isle as identified in the plans and specifications of the Contract Documents. Payment will be made at the unit price included in Section 1.03 and shall constitute full compensation for all labor, material, equipment, and services required for installation to the City's satisfaction for the actual count of units installed and accepted; monies deemed by the City to be not needed will remain with the City. Any use of the allowance is at the sole discretion of the City and the City may choose to use a portion or none of the allowance.

1.05 PROCEDURES FOR ADMINISTRATION OF ALLOWANCES.

A. Funds will only be drawn from Owner contingency allowances by Change Order.

B. Costs shall be as represented in Section 1.03.

1.06 COSTS INCLUDED IN ALLOWANCES

A. Cost of materials to Contractor, less applicable trade discounts.

B. Delivery to site, products handling at site, including unloading, uncrating, and storage.

C. Applicable taxes unless covered by Owner Furnished Equipment agreement.

D. Protection of products from elements and from damage.

E. All labor, insurance, payroll, bonding, equipment rental, expenses for the installation and finishing necessary for a complete working system or product.

F. Other expenses required to complete installation.

G. Contractor field and home office overhead and profit.

1.07 CONTRACTOR RESPONSIBILITIES

A. Promptly notify Engineer of any reasonable objections from supplier.

B. On notification of selection, execute purchase agreement with designated supplier.

C. Arrange for process shop drawings, product data, and samples.

D. Arrange for delivery. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Install, adjust, and finish products.

F. Provide warranties for products and installation.

1.08 CORRELATION WITH CONTRACTOR SUBMITTALS

A. Schedule shop drawings, product data, samples, and delivery dates, in Progress Schedule for products selected under allowances.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01025

BASIS OF PAYMENT

PART 1 -- GENERAL

1.01 GENERAL

A. Payments to the Contractor shall be made on the basis of the bid items listed on the Proposal Bid Form as full and complete payment for furnishing all materials, labor, tools and equipment, and for performing all operations necessary to complete the work included in the Contract Documents. Such compensation shall also include payments for any loss or damages arising directly or indirectly from the work, or from any discrepancies between the actual quantities of work and those shown in the Contract Documents, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the City.

B. The prices stated in the proposal include full compensation for overhead and profit, all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, furnishing and repairing small tools and ordinary equipment, mobilization, home office expenses and general supervision, bond, insurance, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the plans and specified herein. In addition, the Contractor shall include the actual cost of social security taxes, unemployment insurance, worker's compensation, fringe benefits, inclusive of life and health insurance, union dues, pension, pension plans, vacations, and insurance and contractor's public liability and property damage insurance involved in the work based on the actual wages paid to such labor and all other general costs and profits, prorated to each Item.

C. Unless otherwise specifically stated elsewhere herein, the Contractor shall include in the prices bid all materials, electrical supply, fuel, lubricants, temporary equipment, temporary wiring, temporary piping and fittings, pumps, gages, and all other items of whatever nature required to completely test, balance, disinfect if required, and put into fully operational condition all equipment, and/or systems supplied by either the City of Fort Lauderdale or the Contractor and installed as a part of this Project. Further, any test materials supplied by the Contractor shall be completely satisfactory to the City of Fort Lauderdale. Any decision as to whether a particular material is suitable for test purposes shall be at the sole discretion of the Engineer whose decision shall be final. Any material considered not suitable shall be immediately replaced by the Contractor with suitable material and no extra compensation will be allowed.

D. The Basis of Payment for an item at the price shown in the Proposal shall be in accordance with its description of the item in this Section and as related to the work specified and as shown on the Drawings. Unit prices, when used, will be applied to the actual quantities furnished and installed in conformance with the Contract Documents.

E. The Contractor's attention is called to the fact that the quotations for the various items of work are intended to obtain a complete and working installation under this Contract, and any items of labor, equipment or materials which may reasonably be assumed as necessary to accomplish this end shall be supplied whether or not they are specifically shown on the Plans or stated herein. Should the Contractor feel that the cost of any item of work has not been established by the Proposal or Basis of Payment, they shall include the cost for that work in the last Bid Item for each construction package so that their proposal for the project does reflect their total price for completing the work in its entirety.

F. The Contractor shall submit, with each Payment Request, a list of minority-owned business enterprise (MBE) and women-owned business enterprise (WBE) subcontractors that they are or will be utilizing for their contract. For each MBE/WBE Subcontractor, the following information shall be provided:

1. Total sub-contract dollar amount.
2. Amount paid to date.

G. Payments will not be made for rejected or unused products (e.g. rejected or remaining materials, material not unloaded, defective work, etc.).

H. If the bidder makes a mathematical error in the total bid price for the applicable items in the Quotation, the correct sum of its applicable bid item totals shall be the Total Bid.

1.02 MEASUREMENT

The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the City, in accordance with the Schedule of Payment Values as described in Section 00301, unless otherwise specified. A representative of the Contractor and the City shall witness all field measurements.

1.03 PAYMENT ITEMS

For purposes of describing items appearing in the Bid Schedule, pricing for each item shall include the following work and components in addition to those described for each Item No. below.

The price bid shall be full compensation and shall include payment and all labor, equipment, and materials required for a complete, operational, and satisfactory installation, as determined by the City Inspector.

It should be noted that all FDOT roadway standards and specifications are to be followed for all work within FDOT's ROW limits, latest edition(s) and City standards are to be followed for all work outside of FDOT's ROW limits and within the City's ROW limits and jurisdiction.

A. **Item No. 1: Mobilization/Demobilization, Bonds and Insurance**

Payment for mobilization and demobilization will be made at the lump sum price developed from the cost of the unit price items. Mobilization includes, but is not limited to, bonds, insurance, transport of personnel, materials, equipment, and other incidentals to the site, all notifications to public including but not limited to flyers and other notifications, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs meeting City standards, field surveys, sanitary and other facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, security, etc., and all other activities necessary for complete mobilization/demobilization requirement for the contract. Partial payments for mobilization and demobilization will be made as follows: Mobilization shall total 60% of the bid item cost total with demobilization totaling 40% of the bid item cost. Payment shall be 25% of the unit price at the beginning of the work; 50% at 10% project complete; 75% at 25% project complete; and 100% at 100% project complete. The payment items for mobilization shall not exceed 10% of the sum of Bid Items No. 4 through 16.

B. **Item No. 2: Project Record Documents**

Payment for furnishing all labor, materials, and equipment necessary to coordinate, prepare and create the Project Record Drawings, including the certified as-built survey by a PSM licensed in the State of Florida, to be provided in CAD, and PDF, and with associated signed and sealed hard copy sets in accordance with all City's requirements and specifications. Contractor is to include all revisions, updates and City and Engineer's comments in the final set of Project Record Drawings. Payment will be made at the lump sum price divided into equal monthly payments based on the Contract Time and acceptance by Owner of the progressive as-builts drawings and tables provided monthly by the Contractor and maintained up-to-date during the course of construction.

C. **Item No. 3: Maintenance of Traffic (MOT)**

Payment for all labor, equipment and materials for the design and preparation of signed and sealed MOT plans by a Florida Professional Engineer with Advanced MOT Certification(s), permitting, flagman, barricades, VMS boards, all signage, police presence, etc., and installation and removal of traffic control devices, temporary and permanent markings and signage (installing and/or removing and replacing) in various and changing work locations for the duration of the project per applicable authorities having jurisdiction regarding MOT (vehicular and pedestrian), streets and lane closures, phasing of MOT, permitting and permitting agency approvals including all necessary permitting coordination, submittals and fees. Monthly payments shall equal the bid amount divided by the number of months in the contract.

D. **Item No. 4: Construction of Isle of Venice Pump Station D-10 Improvements**

Payment for all labor, equipment, material, testing, permits, and appurtenances for all work necessary and required for the Pump Station D-10 Improvements including all site, structural,

piping, and mechanical demolition, and electrical improvements required to complete the work as specified, *excluding bid items listed elsewhere*, and in accordance with City of Fort Lauderdale standards and making a complete installation (valve vault, core drilling the wet well and making all connections, piping, valves, fittings, etc. inside and downstream of the wet well and valve vault, including 6-inch diameter force main and pump out) in accordance with the details and locations shown on the Plans. This item will be paid at the contract lump sum price bid based upon the approved schedule of values and progress payments supported by installations approved by the Engineer and City. This work shall also include all work described in Section 01025 Paragraph 1.03 F.

E. **Item No. 5: Construction of Hendricks Isle Pump Station D-11 Improvements**

Payment for all labor, equipment, material, testing, permits, and appurtenances for all work necessary and required for the Pump Station D-10 Improvements including all site, structural, piping, and mechanical demolition, and electrical improvements required to complete the work as specified, *excluding bid items listed elsewhere*, and in accordance with City of Fort Lauderdale standards and making a complete installation (valve vault, core drilling the wet well and making all connections, plugging wet well inverts where identified, piping, valves, fittings, etc. inside and downstream of the wet well and valve vault, including 6-inch diameter force main and pump out) in accordance with the details and locations shown on the Plans. Also included is relocation of a 4-inch diameter water main as shown in the plans and in accordance with the specifications. This item will be paid at the contract lump sum price bid based upon the approved schedule of values and progress payments supported by installations approved by the Engineer and City. This work shall also include all work described in Section 01025 Paragraph 1.03 F.

F. **Item No. 6: Furnish and Install 8-inch SDR 26 PVC**

Payment for all labor, equipment and material for all work necessary and required for the installation of the 8-inch SDR 26 PVC gravity sewer and new manhole boots for new connections into manholes. Payment shall be a proration of the unit price: 75% when pipe is installed, backfilled and compacted to grade; 90% following completion of testing and temporary trench restoration; and 100% upon completion of permanent trench restoration. This work shall include but not be limited to:

1. surveying;

2. clearing and grubbing, grading and regrading;

3. locating, protection and support of all existing utilities;

4. coordination with all utility facility owners for locations and relocations of existing utilities; including, but not limited to, gas mains/lines, sewer laterals, water services, and all other utilities;

5. preparation and submittal/resubmittals of shop drawings;

6. preparation of a certified Stormwater Pollution Prevention Plan in accordance with the National Pollution Discharge Elimination System (NPDES) requirements and submittals to the Florida Department of Environmental Protection (FDEP) for review and permit approval as well as preparing, installing, maintaining, phasing of, and removing the erosion control devices necessary to comply with NPDES requirements;

7. tree, shrub and all landscaping and sod removal and replacement and/or protection, tree trimming only as approved prior to construction per the City;

8. protection of existing signs to remain, and removal and replacement of all signage;

9. fencing and gate protection, and removal and replacement;

10. removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain (as applicable);

11. power pole and guy wire support and relocation (including coordination and all applicable fees) and removal and replacement;

12. protection of all above and underground existing features such as irrigation systems, mailboxes, conduits including removal and replacement;

13. piping trench excavation (including exploratory excavations for utilities and all other necessary efforts), sheeting, shoring, and bracing;

14. dewatering, groundwater sampling, all contamination permitting and compliance, treatment and disposal, dewatering plans and permit applications preparation, noise attenuation for all pumping equipment, all fees and permitting; with the exception of City permit fees being paid for by the City.

15. piping of various materials and types as shown on the plans; painting, priming, and coating of piping including special coatings as per the specifications and special piping preparation(s); polyethylene encasement for all domestic ductile iron pipe, valves, and fittings; metallic tracer wire, line locater, and identification markers; pipe installation (8-inch Polyvinyl Chloride SDR-26), all ductile iron poly wrapped fittings (shown and not shown); all necessary pipe fittings, couplings, and adapters; 316 stainless steel washers, nuts, bolts, restraining rods for mechanical joint fittings; restraining devices for proposed and existing water mains;

16. bypass piping, pump out, bypass pumping and noise attenuation for all pumping equipment;

17. connection to existing manholes (core bore or other knock-outs and formwork, re-benching, etc. as needed);

18. metallic tracer wire, line locater, identification markers;

19. pipe removal/installation, backfill material, bedding, removal and disposal of unsuitable soils, compaction, limerock base or other base materials as necessary, prime and tack coats;

20. removal of pavement, excavation, backfill and installation of temporary pavement and final pavement to match existing pavement type, thicknesses, grade, and elevations (3-inch minimum thickness required for FDOT roadways);

21. full restoration and cleanup including phased restoration and daily site cleanup with proper disposal of all debris or fluids;

22. sodding, grading and re-grading, saw cutting, driveway removal and restoration in kind and of varying materials such as asphalt, pavers, decorative concrete, painted concrete, etc., sidewalk, curb, and gutter removal and restoration;

23. all testing and inspections including after hours or non-standard working hours inspections and all fees;

24. exfiltration trench, drainfield and drainage piping and system removal and replacement;

25. all necessary accessories or appurtenances required for a complete installation;

26. as-built documentation signed and sealed by as PSM in hardcopy and electronic form and meeting City standards (PDF and AutoCAD), project record drawings;

27. bill of sale, conveyance of new improvements to the City, release of bond and closeout of all permits;

28. all other restorations and other related work not defined in other Bid Package Items.

The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation. Measurement will be based on the laying length of the pipe in linear feet actually placed as measured along the centerline of the completed and installed pipe, including the length of fittings between the limits shown on the Drawings.

G. **Item No. 7: Wet Wells and Valve Vaults Cleaning and Preparation**

Measurement for payment to clean and prepare the wet wells and valve vaults for Pump Stations D-10 and D-11 prior to all rehabilitation work and coatings will be based on a complete finish to the City's satisfaction and in accordance with the requirements of the Contract Documents. This work shall include but not be limited to, sand-blasting, cleaning, grouting, remediation of wet wells and valve vaults, and all necessary preparation prior to coating the wet wells and valve vaults including but not limited to Section 01025 Paragraph 1.03 F. Payment shall be made at the unit price named in the Bid Schedule and shall constitute full compensation for cleaning and preparing D-10 and D-11 to meet all City standards and specifications and manufacturer's recommendations prior to coating of said infrastructure.

H. **Item No. 8: Concrete Rehabilitation**

Payment for all labor, equipment and material for all work necessary and required for the Concrete Rehabilitation, as shown in the plans. Payment shall be a proration of the unit priced: 75% when the concrete repair, chemical grout injection, and coating are installed, the trench is fully restored, and the City is accepting of the work and 100% with successful testing and the City's acceptance. This work shall including but not limited to Section 01025 Paragraph 1.03 F. In addition, this work shall account for concrete repair, chemical grout injection of the wet well and valve vault, coating of the wet well and valve vault, and Spark testing (Holiday Detection) for all Epoxy Coating applications.

I. **Item No. 9: Fittings and Piping Painted on the Pipe Exterior in the Valve Vault and Wet Well**

Measurement for payment to paint the exterior of all non-stainless steel fittings within the valve vault will be based on the requirements of the Contract Documents. Payment will be made at the unit price named in the Bid Schedule and shall constitute full compensation for the transporting, offloading, painting, finishing, and disposal of the work identified on the plans and specifications to the City's satisfaction. This work shall also include all work described above in Paragraph 1.03 F.

J. **Item No. 10: Final Certified Interior Manhole and Wet Well Inspections**

Payment for all labor, equipment and material for all work necessary and required for the final certification inspection of the interior manhole and wetwell, as shown in the plans. This work shall include but not be limited to Section 01025 Paragraph 1.03 F, final certification inspection, and all necessary items to complete the inspection. Payment will be made at the unit price named in the Bid Schedule and shall constitute full compensation upon receipt of the certification.

K. **Item No. 11: Bypass Pumping**

Payment for all labor, equipment and material for all work necessary and required for bypass pumping operations to meet all required submittals and approvals, including but not limited to, preparation of bypass pumping plan, response to comments and revisions to bypass pumping plan to obtain final approvals from the City and Engineer and jurisdictional agencies as necessary, maintenance of traffic submittals, permits and approvals including any permit fees (with the exception of City permit fees being paid for by the City), calculations for bypass pumping, noise attenuation, alarms and 24-hour monitoring of bypass pumping operations, phasing for bypass pumping operations, storage and transport and disposal of wastewater as needed for bypass operations, emergency procedures, protocol and compliance in the event of an emergency including all associated costs for any wastewater spills and fees from all associated regulatory agencies in the event of a wastewater spill or overflow or similar occurrence, coordination with City Operations staff and necessary to facilitate and implement all bypass operations performed by the Contractor, all piping, fittings and appurtenances, fuel, enclosures for noise attenuation, clean up and all other items to install, operate and maintain bypass pumping operations and phased bypass pumping operations throughout the duration of the project. This work shall also include all work described above in Paragraph

1.03 F.

L. **Item No. 12: Manhole Rehabilitation**

Measurement for payment to rehabilitate existing manhole with protective liner to be based on the requirements of the Contract Documents. Payment will be made at the unit price named in the Bid Schedule and shall constitute full compensation for all labor, manholes, material, and services required for the concrete, repair, preparation, and installation of the liner, grout, ring and cover, site work, core work, demolition, rebenching flow channels, and complete rehabilitation identified on the plans and specifications to the City's satisfaction. This work shall also include all work described above in Paragraph 1.03 F.

M. **Item No. 13: New Manhole**

Measurement for payment to furnish and install new manholes as shown in the plans with traffic rated covers, concrete collars, re-benching of the existing manhole flow channels, new manhole benching flow channels, and all coatings as per the requirements of the Contract Documents. In addition, installation of new sewer inflow dishes for the existing and new manhole, and a new chimney seal for the existing manhole as called out on the plans and meeting the City's manufacturer's requirements. Payment will be made at the unit price named in the Bid Schedule and shall constitute full compensation for all labor, material, and equipment required for a complete and usable installation to the City's satisfaction for the actual count of units installed and accepted. This work shall also include all work described above in Paragraph 1.03 F.

N. **Item No. 14: Replace Pumps**

Measurement for payment to furnish and install new submersible pumps per the specifications of the Contract Documents. Payment will be made at the unit price named in the Bid Schedule and shall constitute full compensation for all labor, material, equipment, start-up testing, and services required for the installation of the pumps including pumps, miscellaneous piping *not listed elsewhere*, and appurtenances, guide rails, aluminum safety hatches, cable, cable holders, supports, training, and test/start-up of the pumps to the City's satisfaction for the actual count of units installed and accepted. This work shall also include all work described above in Paragraph 1.03 F.

O. **Item No. 15: Electrical Improvements**

a. D-10 Isle of Venice

Payment for the removal of existing equipment, and purchase and installation of electrical equipment for pump station D-10, located at the Isles of Venice, will be made at the Contract lump sum price. This item includes wire, conduit, wiring devices, new grounding infrastructure, variable frequency drives, all associated appurtenances in accordance with the project plans, testing and potential relocation of the existing control panel as required by the Florida Department of Environmental Protection. Also included are any costs to be incurred with Florida Power and Light Company. This work shall also include all work described above in Paragraph 1.03 F.

b. D-11 Hendricks Isle:

Payment for the removal of existing equipment, and purchase and installation of electrical equipment for pump station D-11, located at the Hendricks Isle, will be made at the Contract lump sum price. This item includes wire, conduit, wiring devices, new grounding infrastructure, variable frequency drives, all associated appurtenances in accordance with the project plans, testing, and potential relocation of the existing control panel as required by the Florida Department of Environmental Protection. Also included are any costs to be incurred with Florida Power and Light Company. This work shall also include all work described above in Paragraph 1.03 F.

P. Item No. 16: CCTV for the Gravity Sewer

Measurement for payment to perform closed circuit television (CCTV) for entire D-10 and D-11 gravity sewer system basins as indicated in the plans and specifications of the Contract Documents. Payment will be made at the unit price named in the Bid Schedule and shall constitute full compensation for all labor, material, equipment, and services required for surveying and reporting to the Engineer and the City. This work shall also include all work described above in Paragraph 1.03 F.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END OF SECTION

SECTION 01046

MODIFICATIONS TO EXISTING STRUCTURES, PIPING, AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish all labor, materials, equipment and incidentals required to modify, alter, and convert existing structures as shown or specified and as required for the installation of new mechanical equipment, piping, and appurtenances. Existing piping and equipment shall be removed, salvaged, abandoned, or dismantled as necessary for the performance of the Work.

1.02 RELATED SECTIONS

A. Section 01010 – Special Project Procedures

B. Section 01310 – Construction Progress Schedules

C. Other Sections as applicable.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall cut, repair, reuse, excavate, demolish, or otherwise remove parts of the existing structures or appurtenances, as indicated on the Drawings or specified herein or necessary for the performance of the Work.

B. The above work shall include the cutting of grooves and chases in existing masonry to permit the proper bonding of new masonry to old, repainting of existing masonry, the drilling of holes into bolts, or other appurtenances, and the cutting of holes in masonry for the installation of pipe, conduits, and other appurtenances. The work shall include all necessary cutting and bending of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.

C. Blasting with explosives will not be permitted to complete any work under this Contract.

D. Care shall be taken not to damage any part of existing buildings, foundations, and exterior structures both below and above ground.

E. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and to the extent approved by the Engineer.

F. When removing materials or portions of existing structures and when making openings in walls and partitions, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures or contents by falling or flying debris and not to damage the structures from excavation or undermining of existing structural supports, beams, footings, columns or any structural member.

G. Materials and equipment removed in the course of making alterations and additions shall remain the property of the Owner, except that items not salvageable, as determined by the Engineer and the Owner shall become the property of the Contractor to be disposed of by him off the site of the work at his own place of disposal. The Contractor shall assist the Owner in loading and hauling of salvageable materials within the City limits of the project.

H. All work of altering existing structures shall be done at such time and in such manner as will comply with the approved time schedule. So far as possible before any part of the work is started, all tools, equipment, and materials shall be assembled and made ready so that the work can be completed without delay.

I. All workmanship and new materials involved in constructing the alterations shall conform to the General Specifications for the classes of work insofar as such specifications are applicable.

J. All cutting of existing masonry or other material to provide suitable bonding to new work shall be done in a manner to meet the requirements of the respective section of these specifications covering the new work. When not covered, the work shall be carried on in the manner and to extent directed by the Engineer.

K. Where holes in existing masonry are required to be sealed, unless otherwise herein specified, they shall be sealed with cement mortar or concrete. The sides of the openings shall be provided with keyed joints and shall be suitably roughened to furnish a good bond and make a watertight joint. All loose or unsound material adjacent to the opening shall be removed and, if necessary, replaced with new material. The method of placing the mortar seal shall provide a suitable means of releasing entrapped air.

L. Surfaces of seals visible in the completed work shall be made to match as nearly as possible the adjacent surfaces.

M. Non-shrink grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown.

N. Operating equipment shall be thoroughly cleaned and then lubricated and greased for protection during prolonged storage.

O. The Contractor shall provide flumes, hoses, piping, etc. to divert or provide suitable plugs, bulkheads or other means to hold back the flow of wastewater, water or other liquids, all as required in the performance of the work under this Contract.

3.02 SALVAGE

A. Any existing equipment or material, including but not limited to, motors, electrical components or controls, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the Engineer or Owner, and. if so, shall be removed or excavated, if necessary, and delivered to the Owner at a location directed by the Owner. Any equipment or material not worthy of salvaging, as directed by the Owner, shall be disposed of by the Contractor at a suitable location.

3.03 CONNECTING TO EXISTING PIPING AND EQUIPMENT

A. The Contractor shall verify exact location, material, alignment, joint, etc. of existing piping and equipment prior to making the connections called out in the Drawings. The verifications shall be performed with adequate time to correct any potential alignment or other problems prior to the actual time of connection.

B. The Contractor shall dismantle and remove all existing equipment, piping and other appurtenances required, he shall cut existing pipelines for the purpose of making connections thereto. Anchor bolts for equipment and structural steel removed shall be cut off one inch below the concrete surface. Surface shall be finished as specified in Division 3.

C. At the time that a new connection is made to an existing pipeline, additional new piping, extending to and including the most convenient new valve, shall be installed.

D. Where necessary or required for the purpose of making connections, the Contractor shall cut existing pipe lines in a manner to provide an approved joint. Where required, he shall weld beads, flanges or provide Dresser Couplings, all as specified and required.

END OF SECTION

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SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The Contractor shall provide and pay for field engineering service for Project.

1. Survey work required in execution of Work.

2. Civil, structural, or other professional engineering services specified or required to execute Contractor's construction methods.

3. The method of field staking for the construction of the Work shall be at the option of the Contractor. The Owner has provided the engineering surveys necessary to establish reference points which in his judgement are necessary to enable the Contractor to proceed with his work.

4. The accuracy of any method of staking shall be the responsibility of the Contractor. All engineering for vertical and horizontal control shall be the responsibility of the Contractor.

5. The Contractor shall be held responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the Contractor, the Contractor shall not proceed with any work until he has established such points, marks, lines, and elevations as may be necessary for the prosecution of the Work.

6. The Contractor shall retain the services of a registered land surveyor licensed in the State of Florida to identify existing control points and maintain a survey during construction.

7. All Right-of-Way (ROW) and easement limits are to be staked and field verified by the Contractor’s surveyor.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract.

2. Summary of Work: Section 01010.

3. Project Record Documents: Section 01720.

1.02 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. Qualified engineer or registered land surveyor, acceptable to the Owner and the Engineer.

B. Registered professional engineer of the discipline required for the specific service on the Project, currently licensed in the State of Florida.

1.03 SURVEY REFERENCE POINTS

A. Locate and protect control points prior to starting site work, and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.

2. Report to the Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

3. Require surveyor to replace Project control points which may be lost or destroyed at no additional cost to the Owner. Establish replacement based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of two (2) permanent bench marks on site, referenced to data established by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:

1. Site improvements:

a. Stakes for grading, fill, and topsoil replacement.

b. Utility slopes and invert elevations.

2. Batter boards for structure(s).

1.05 RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses.

B. At the end of the project, submit a certified site survey at a minimum 1 inch equals 20 feet scale on sheets 24 inches by 36 inches (or scale of original drawings), indicating the corners and location of all new structures and slabs and elevations of all wastewater and water facilities, pavement areas, sidewalks, finished floors, vaults, and above grade piping.

C. At the end of the project, submit a certified survey at the same scale as the Engineer's line drawings indicating elevations and stationing at 100-foot pipe increments and at all valve and fitting locations.

D. See Section 01720 – Project Record Documents, for project specific requirements.

1.06 SUBMITTALS

A. Submit name and address of surveyor to the Engineer.

B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.

C. Submit certificate signed by a registered engineer or surveyor certifying that elevations and locations of improvements are in conformance with the Contract Documents, or if not in conformance, certify as to variances from the Contract Documents.

D. Submit drawings showing locations of all structures constructed. This drawing shall be included with the Project Record Documents.

E. All submittals must meet City requirements, address City and Engineer comments, and be revised accordingly. The Contractor shall familiarize themselves with the City's requirements prior to submitting any as-builts or Project Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTRACTOR'S EXECUTION

A. The Contractor is responsible for all surveying necessary to produce accurate Record Drawings based on as-built surveying performed during the on-going work effort. If discrepancies exist between the as-built and installed work, the Contractor will be required excavate and expose the work as necessary to confirm accuracy and to meet the intent of the design plans and rectify any discrepancies at their cost. All FDEP/DOH separations must be met and any potential issues which may not allow for the required separations to be met must be immediately brought to the attention of the Engineer. Not meeting FDEP or DOH separation requirements or other design requirements not previously agreed to by the Engineer or City will be unacceptable and at the risk of the Contractor to rectify at their cost.

END OF SECTION

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SECTION 01065

PERMITS

PART 1 – GENERAL

1.01 General:

A. The Contractor shall obtain and pay for all permits, licenses and fees related to the work with the exception of all City permit fees being paid for by the City. The Contractor shall also initiate the City's review and secure City approval prior to commencement of the work. Inspection by City personnel is required in addition to, not in lieu of, regulatory jurisdictional agencies and County department inspections. No project will be accepted until it has passed all inspections, including pavement installation or replacement and restoration.

B. The Contractor shall familiarize himself with, and comply with, all requirements of required permits governing all work under this Contract. The Contractor's particular attention is called to any Special Conditions of the permits relating to construction procedures, excavation and backfill requirements, open trench restrictions, turbidity control, dewatering and sampling, traffic control, pavement restoration and all other general and special conditions. In the event any of the conditions of the permits are in conflict with the requirements of these Specifications, the most stringent conditions shall take precedence.

C. The City has obtained the following permits for the project (located in the Appendix):

Agency	D-10 Permit No.	D-11 Permit No.
Broward County Environmental Protection and Growth Management Department (EPGMD)	GTL #054569-638	GTL #054569-639

Contractor is responsible to obtain any other permits required to complete construction at no additional cost to the City.

D. Any deviations from the Plans, Specifications or required permits, must first be approved by the City even if approval for the change has been given by the permitting agency.

E. The Contractor shall fully assume all obligations and responsibilities, monetary and otherwise, imposed by the permits throughout the life of the project, including but not limited to:

1. Proper maintenance of permit documentation and field records.

2. Proper maintenance of all permit-required field controls; including but not limited to the following:

   a. Dewatering.
   b. Chemical spill prevention.
   c. Erosion, sedimentation, turbidity and dust retention.
   d. Protection of storm drainage facilities.
   e. Temporary vehicular and pedestrian traffic controls.

3. Payment of fines resulting from permit non-compliance.

4. Maintaining active permits and obtaining permit extensions when needed.

5. Providing certifications of all materials and equipment installed.

6. Performing successful inspections and tests required by the permits.

7. Correcting any work that is not in compliance with permits.

8. Performing successful equipment start-ups.

9. Repair of any permanent traffic controls impacted by Contractor.

10. Close-out of all permits.

F. All surveying required by the project permits will be done by the Contractor's Florida registered Land Surveyor. This includes staking out limits of construction and Field Engineering per Section 01050.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01070

APPLICABLE STANDARDS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Wherever references are made in these specifications to any published standards, codes, standard specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. References shall be to the latest versions currently in effect, unless otherwise specified by the City and/or Engineer. As a guide to the user of these specifications, the following acronyms or abbreviations which may appear in these specifications shall have the meanings indicated herein. Not all acronyms or abbreviations are included in the listing below. It shall be the Contractor's responsibility in inquire with the City or Engineer if they have any questions regarding abbreviations used within the Contract documents.

B. The following is a partial list of typical abbreviations which may be used in the Specifications, and the organizations to which they refer. Abbreviated titles for other governing standards are used throughout these specifications and, although most of them are widely known, their complete titles are given below to avoid misunderstanding:

1. AAMA - Architectural Aluminum Manufacturer's Association
2. AASHTO - American Association of the State Highway and
3. ACI - American Concrete Institute
4. ACI - American Concrete Institute
5. ACIFS - American Cast Iron Flange Standards
6. ACOE - Army Corps of Engineers
7. ACPA - American Concrete Pipe Association
8. AFBMA - Anti-Friction Bearing Manufacturer's Association
9. AGMA - American Gear Manufacturer's Association
10. AGA - American Gas Association
11. AGMA - American Gear Manufacturers Association
12. AHGDA - American Hot Dip Galvanizers Association
13. AI - The Asphalt Institute
14. AIA - American Institute of Architects
15. AISC - American Institute of Steel Construction
16. AISI - American Iron and Steel Institute
17. AITC - American Institute of Timber Construction
18. AMCA - Air Moving and Conditioning Association
19. ANSI - American National Standards Institute, Inc.
20. APA - American Plywood Association
21. API - American Petroleum Institute
22. APHA - American Public Health Association

23. APWA - American Public Works Association
24. ASA - Acoustical Society of America
25. ASAE - American Society of Agriculture Engineers
26. ASCE - American Society of Civil Engineers
27. ASHRAE - American Society of Heating, Refrigerating, and Air-Conditioning Engineers
28. ASLE - American Society of Lubricating Engineers
29. ASME - American Society of Mechanical Engineers
30. ASMM - Architectural Sheet Metal Manual
31. ASSE - American Society of Sanitary Engineers
32. ASTM - American Society for Testing and Materials
33. AWI - Architectural Woodwork Institute
34. AWPA - American Wood Preservers Association
35. AWPI - American Wood Preservers Institute
36. AWS - American Welding Society
37. AWWA - American Water Works Association
38. BCDPEP Broward County Department of Planning and Environmental Protection (formerly BCDNRP)
39. BCEPD Broward County Environmental Protection Department (formerly BCDPEP)
40. BCEPGMD - Broward County Environmental Protection and Growth Management Department (formerly BCEPD)
41. BCHD – Broward County Health Department
42. BHMA - Builders Hardware Manufacturer's Association
43. CMA - Concrete Masonry Association
44. CRSI - Concrete Reinforcing Steel Institute
45. CSA - Canadian Standards Association
46. DHI - Door and Hardware Institute
47. DIPRA - Ductile Iron Pipe Research Association
48. EIA - Electronic Industries Association
49. ETL - Electrical Test Laboratories
50. FBC - Florida Building Code
51. FDEP - Florida Department of Environmental Protection
52. FDOT - Florida Department of Transportation
53. FS - Federal Specifications
54. ICEA - Insulated Cable Engineers Association
55. IEEE - Institute of Electrical and Electronics Engineers
56. IES - Illuminating Engineering Society
57. IPCEA - Insulated Power Cable Engineers Association
58. ISA - Instrument Systems and Automation
59. ISO - International Organization for Standardization
60. MBMA - Metal Building Manufacturers Association
61. MMA - Monorail Manufacturers Association
62. MTI - Marine Testing Institute
63. NAAMM - National Association of Architectural Metal Manufacturers
64. NACE - National Association of Corrosion Engineers
65. NBS - National Bureau of Standards
66. NCPI - National Clay Pipe Institute

67. NEC - National Electrical Code
68. NEMA - National Electrical Manufacturer's Association
69. NFPA - National Fire Protection Association
70. NLMA - National Lumber Manufacturers Association
71. NIOSH - National Institute of Occupational Safety and Health
72. NIST - National Institute of Standards and Testing
73. NRCA - National Roofing Contractors Association
74. NSF - National Sanitation Foundation
75. OSHA - Occupational Safety and Health Administration
76. PCA - Portland Cement Association
77. SMACCNA - Sheet Metal and Air Conditioning Contractors National Association
78. SAE - Society of Automotive Engineers Standards
79. SHBI - Steel Heating Boiler Institute
80. SMACCNA - Sheet Metal and Air Conditioning Contractors National Association
81. SSPC - Steel Structures Painting Council
82. SSPWC - Standard Specifications for Public Works Construction
83. SFWMD - South Florida Water Management District
84. UL - Underwriters Laboratories, Inc.

C. Contractor shall, when required, furnish evidence satisfactory to the Engineer that materials and methods are in accordance with such standards where so specified.

D. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on site by the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01100

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 PUBLIC NOTIFICATION

A. Contractor is to provide project notifications and associated information via door hanger handouts for residents that will be impacted during construction. The door hangers are to be provided for City review at the **Pre-Construction Meeting** for approval prior to distribution. The door hangers shall include, as a minimum, anticipated start date, brief project description, and measures to be taken to minimize adverse impacts to residents. Contractor to hang door hangers upon approval by the City.

1.02 SEQUENCE OF WORK

A. The Contractor shall establish his work sequence based on the use of crews to facilitate completion of the construction within the specified contract time. Contractor shall submit a detailed phasing and project construction sequencing schedule and plan as required. See project specifications herein for additional requirements.

1.03 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.

B. Operating machinery or the performing of any kind of work of any nature whatsoever, which produces noises of any kind audible outside of any garage, shop or other place of business located adjacent to the residential sections of the City between the designated work hours on any day shall be a violation of the City's Code. In addition, other work hours as required for the various jurisdictional agency project permits must be followed at all times.

C. Sound levels measured by the City shall not exceed 65 dBA, or as required by City noise standards. This sound level shall be measured at the nearest property line of the nearest residence. Sound levels in excess of these values are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Engineer or City for excessive noise shall not relieve the Contractor of the other portions of this Specification including, but not limited to, completion dates and bid amounts. Noise attenuation is required for all pumping equipment and additional noise attenuation measures may be required by the City due to the project work limits. All noise attenuation measures are to be installed and maintained at the Contractor's cost and no additional compensation shall be provided by the City for enhanced noise attenuation measures.

D. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

E. Vibration Control shall be in accordance with Federal, State, and City regulations. It is the Contractor's sole responsibility to prevent damage from vibration to adjacent structures and property.

1.04 EXISTING UTILITIES

A. Pipe Locations. All pipes shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing utilities, structures, or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required. No additional compensation will be allowed for use of additional fittings that are not agreed upon by the City and/or the Engineer prior to installation of the fittings. Refer to Section 01025 for measurement of payment items.

B. Utility Conflicts. Contractor must identify all locations where there is the possibility of conflicts with existing utilities. Contractor will promptly notify the City and Engineer in writing in accordance with these documents. Contractor acknowledges that resolving utility conflicts can sometimes require permitting. The City will grant additional days to the Contractor to cover the length of unanticipated delay in writing, only if proper due-diligence for locating of existing utilities have been performed in advance of construction. However, under no circumstances will the Contractor be eligible for remobilization costs.

C. Utility Verifications. Contractor is required to field verify all existing utilities, prior to the commencement of construction. Lack of field verifications via such methods as subsurface utility excavations (SUEs or soft digs, etc.), in advance of construction, will not constitute any justifiable delays by the Contractor during construction.

1.05 ADDITIONAL TRAFFIC REQUIREMENTS

A. Contractor will be responsible for coordination, preparation and submittal(s) of Maintenance of Traffic (MOT) plans per to meet all jurisdictional authorities' requirements for submittals within their right-of-way limits. MOT will also be submitted for all private roadways. Contractor shall be the responsible party relating to all aspects of traffic permitting. Approval must be received from the regulatory authority prior to commencement of any work within their right-of-way limits. No additional compensation will be provided for submittals, permitting or signed and sealed MOT plans to meet all regulatory agencies requirements.

B. Night work or weekend work may be required for various areas within the project limits. The Contractor is responsible for costs associated with all night work including but not limited to, inspector costs, police or flagmen costs, signage and MOT costs and all other costs associated with night or weekend work.

C. No excavations shall be left exposed or unattended while Contractor is not on premises.

D. The Contractor must maintain vehicular and pedestrian access at all times.

1.06 RESTORATION

A. Contractor shall be responsible for restoration of all disturbed areas during construction with equal or better quality, quantity, material and size. The extent of restoration limits or items within the project limits that may require restoration due to the Contractor's means and methods and associated work limits is not shown on the drawings and all restoration costs shall be the responsibility of Contractor. In addition, timely restoration shall be required by the Contractor. No more than 400 liner feet of trench length shall be opened at any one location. **The City and Engineer reserve the right to notify the Contractor of any areas that will be required to be restored in advance of larger scale restoration efforts; such as but not limited to, paving restoration, concrete restoration, sod restoration, sidewalk restoration, driveway or curb restoration, landscape restoration or other restoration efforts which may need to be performed in advance to minimize disturbances to residents or for other purposes such as safety concerns, public nuisance, etc.**

1.07 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by workmen.

B. Open excavations are not permitted overnight and must be backfilled or covered with steel plates.

1.08 TEST PITS

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the Engineer. The costs for such test pits shall be borne by the Contractor.

1.09 JURISDICTIONAL DISPUTES

A. It shall be the responsibility of the Contractor to pay all costs that may be required to perform any of the Work shown on the Drawings or specified herein in order to avoid any work stoppages due to jurisdictional disputes. The basis for subletting Work in question, if any, shall conform with precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, latest edition, including any amendments thereto.

1.10 HURRICANE AND STORM WARNINGS

A. As the schedule for this project coincides, in part, with the recognized South Florida hurricane season, the Contractor's attention is drawn to the possibility of hurricane conditions, or severe storm conditions, occurring at the plant site during the course of Contract work.

B. Within 30-days of the date of Notice-to-Proceed, the Contractor shall submit to the Engineer and City a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the City in case of a hurricane warning.

C. In the event of inclement weather, or whenever the Engineer shall direct, the Contractor shall, and will cause Sub-Contractors to protect carefully the Work and materials against damage or injury by reasons of failure on the part of the Contractor to so protect the Work. Such Work and materials so damaged shall be removed and replaced at the expense of the Contractor.

1. Hurricane Watch: Upon designation of a hurricane watch, Contractor shall be responsible for storing all loose supplies and equipment on the job site that may pose a danger. In addition, the Contractor shall remove all bulkheads and plugs in pipelines that would impede drainage in the case of flooding. Structures that may be in danger of floatation shall be flooded. The Contractor shall also cooperate with City personnel in protecting other structures at the site.

2. Hurricane Warning: No mobile “temporary facility” under the control of the City of Fort Lauderdale, or on City property, shall be staffed during a hurricane warning. Contractor facilities meeting these criteria shall comply.

D. The Contractor is advised to take all necessary precautions to protect his equipment by moving it to higher ground if in an area is subject to flooding.

1.11 PESTS AND RODENTS

A. The Contractor shall be responsible for maintaining the jobsite free from litter, rubbish and garbage and shall provide containers for the disposal of garbage and other materials that attract and are breeding places for pests and rodents. The Contractor shall provide the services of an exterminator to inspect the jobsite on a periodic basis and to provide service as required to control pests and rodents, as applicable and at no cost to the City.

1.12 COORDINATION OF WORK

A. The Contractor shall cooperate fully so as to eliminate or minimize the creation of conflicts. Adjustments from time to time may be required in the Contractor's work location and/or schedule provided a reasonable notice is given by the City or Engineer.

1.13 USE OF PUBLIC/PRIVATE STREETS

A. The use of public/private streets and roads shall be such as to provide a minimum of an inconvenience to the public and to other traffic. Any earth or other excavated materials spilled from trucks shall be removed by the Contractor and the streets and roads cleaned to the satisfaction of the City or Engineer.

B. Access to properties along the Project must be maintained at all times throughout the duration of the Project.

1.14 CHEMICALS

A. All chemicals used during project construction, or furnished for project operations, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of the State Department of Health, Florida Department of Environmental Protection and if required, also the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with the manufacturer's instructions or recommended use procedures.

1.15 SAFETY AND HEALTH REGULATIONS

A. The Contractor shall comply with the Department of Labor Safety & Health Regulations for construction promulgated under the Occupational Safety & Health Act of 1970, latest editions.

B. All equipment furnished and installed under this Contract shall comply to the Occupational Safety & Health Standards & Amendments thereto.

C. The Contractor shall comply with the Florida Trench Safety Act.

1.16 STATE AND FEDERAL PERMITS

A. The Contractor is required to comply with and meet all applicable State and Federal permits. The City has provided the permits as included in the Appendix of the Contract documents. All other necessary permits shall be at the Contractor’s cost and the Contractor shall be required to secure them prior to associated jurisdictional work. All conditions set forth in the permits shall become part of the Contract.

1.17 INSPECTION

A. The authorized representatives and agents of the Environmental Protection Agency and Controlling State and Local Pollution Control Agencies shall be permitted to inspect all work, material, payrolls, personnel records, invoices of materials and any other relevant data and records. The City and Engineer shall be permitted access to any work area for the inspection of work and materials. The City may, at the Contractor's expense, order the uncovering or removal of any finished work if circumstances indicate faulty work or materials were used in the original installation. The City and Engineer shall also be

permitted to inspect material invoices, payrolls or any other relevant data or records as may be necessary or required to satisfy the requirements of the Contract.

1.18 ENVIRONMENTAL PROTECTION

A. General:

1. Contractor shall comply with all Federal, State and Local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter. In the event of conflict between such laws and regulations and the requirements of the Specifications, the more restrictive requirements shall apply. Environmental protection requirements specified in other Sections shall be considered as supplementing the requirements of this Section.

2. Failure of the Contractor to fulfill any of the requirements of this Section may result in the City ordering the stopping of construction operations.

3. Failure on the part of the Contractor to perform the necessary measures to control erosion, siltation, and pollution will result in the City notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the City may stop the Work as provided above, or may proceed to have such measures performed by others. The cost of such work performed by others plus related fees by the Engineer will be deducted from monies due the Contractor on his Contract.

4. All erosion and pollution control features installed by the Contractor shall be acceptably maintained by the Contractor during the time that construction work is being done.

5. Repair or replace damaged or inoperative erosion and pollution control devices as directed by the Engineer or the City's Representative.

6. Where there is a high potential for erosion and possible water pollution, the Contractor shall not expose, by his construction methods or procedures, an area of erosive land at any one time larger than the minimum amount required for the proper and efficient construction operation. If the exposure of any incomplete work corresponding to the exposure period required for erosion is anticipated, temporary protective measures shall be taken to prevent the erosion or collapse of land in that immediate construction area.

B. Erosion and Pollution Control Schedule: At or prior to the preconstruction conference, the Contractor shall submit to the City for his information, three (3) copies of his erosion and pollution control work schedule. This schedule shall show the time relationship between phases of the Work which must be coordinated to reduce erosion and pollution,

and shall describe construction practices and temporary control measures which will be used to minimize erosion and pollution. The schedule shall also show the Contractor's proposed method of erosion control on haul roads and borrow and material pits, and his plan for disposal of waste materials or other sources of pollution. Maps or other documents may also be required to show the proposed final surface gradient of proposed borrow pits, soil type base course pits, and waste areas. No work shall be started until the erosion and pollution control schedules and methods of operations have been submitted to the City for his information.

C. Air Pollution Controls:

1. Contractor shall control dust caused by his operations in the construction of the Project, including but not specifically limited to the following:

   a. Clearing, grubbing, and stripping.
   b. Excavation and placement of embankment.
   c. Cement and aggregate handling.
   d. Limerock stabilization.
   e. Use of haul roads.
   f. Sandblasting or grinding.
   g. Emissions of from any transport.
   h. Grading
   i. disposal of solid waste.

2. Contractor shall control air pollution from the following causes in constructing the project:

   a. Volatiles escaping from asphalt and cutback materials.
   b. Use of herbicides or fertilizers.

3. Control of dust and other air pollutants by the Contractor shall include:

   a. Exposing the minimum area of land.
   b. Applying temporary mulch with or without seeding.
   c. Use of water sprinkler trucks.
   d. Use of covered haul trucks.
   e. Use of stabilizing agents in solution.
   f. Use dust palliatives and penetration asphalt on temporary roads.
   g. Use of wood chips in traffic and work areas.
   h. Use of vacuum-equipped sandblasting systems.
   i. Use of plastic sheet coverings.
   j. Restricting the application rate of herbicides to recommended dosage. Materials shall be covered and protected from the elements. Application equipment and empty containers shall not be rinsed and discharged so as to pollute a stream, river, lake, pond, water impoundment, or the ground water.
   k. Relay of operations until climate or wind conditions dissipate or inhibit the potential pollutants.

l. Cover loads of materials, debris and soil transported from construction sites.
m. Daily water down and sweep streets which have heavy volumes of construction vehicles carrying debris and excavated materials.
n. Establish regular cycles and locations for washing trucks which haul soil from the site.
o. Water down construction sites as needed to suppress dust, during handling of excavation soil or debris or during demolition.
p. Removal of particulate matter from equipment before movement to paved streets.
q. Prompt removal of visible particulate matter from paved streets.
r. Use construction equipment which has been designed and equipped to prevent or control air pollution in conformance with the regulations of the EPA, state and local authorities.
s. Establish and maintain records of the routine maintenance program for internal combustion engine powered vehicles and equipment used on the project.

D. Open Burning of Combustible Wastes: No open burning of combustible waste materials or vegetation shall be permitted. All waste materials shall be removed from the site or within public rights-of-way and disposed in accordance with laws, codes, regulations, ordinances and permits..

E. Permanent and Temporary Water Pollution Control (Soil Erosion):

1. Sufficient precautions shall be taken during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish, or other life, into the supplies and surface waters of the State. Control measures must be adequate to assure that turbidity in the receiving water will not be increased more than allowed by the State or controlling agency. Such measures may consist of construction of berms, dikes, dams, drains and sediment basins, or use of fiber mats, woven plastic filter cloths, gravel, mulches, quick growing grasses, sod, bituminous spray and other erosion control devices or methods approved by the State or controlling agency.

2. The Contractor shall promptly clear all waterways and drainage patterns of false work, piling, debris, or other obstructions placed during construction work and not a part of the finished work.

3. The Contractor shall remove and dispose of silt accumulations as directed by the Engineer or the City's Representative.

4. If new and additional erosion control structures are to be installed, under this project, to prevent possible future erosion as a result of work under this contract, they shall be constructed concurrently with the other work, as early as possible, and as conditions permit.

1.19 TREE AND SHRUB PROTECTION AND TRIMMING

A. Contractor shall exercise care to protect all trees and shrubs designated to remain. Trees and shrubs outside construction limits shall remain and shall be protected and where damaged, restored to original condition. Contractor shall obtain approval from the City prior to removing or trimming any trees. Trees damaged within construction limits due to negligence shall be restored or replaced to meet original condition.

B. Tree limbs which interfere with construction operations and are approved for pruning shall be neatly cut with sharp pruning instruments; do not break or chop. All cut faces shall be coated with an approved tree pruning compound which is waterproof, antiseptic, elastic and free of kerosene, coal tar, creosote and other substances harmful to plants. Pruning operations shall be extended to restore the natural shape of the entire tree or shrub. Do not allow fires under or adjacent to trees or other plants which are to remain.

C. Contractor shall protect tree and shrub root systems. Do not store construction materials, debris or excavated materials beyond construction limits. Do not permit vehicles or construction equipment beyond the limits of utility line construction. Restrict foot traffic to prevent excessive compaction of soil over root system. Excavated material shall be stockpiled away from tree drip lines as approved by the Engineer. Protect tree and shrub root systems from damage due to noxious materials in solution caused by run-off or spillage during construction operations, or drainage from stored materials. Protect root systems from flooding, erosion or excessive wetting resulting from dewatering operations. Excavate within the drip line of trees only when approved by the Engineer. Where trees are designated to remain within the limits of construction and trenching for utilities is required within tree drip lines, cut roots with sharp pruning instruments; do not break or chop. Paint roots over 2" caliper with approved tree pruning compound.

D. Trees damaged by construction operations shall be repaired promptly after damage occurs to prevent progressive deterioration of damaged trees. Removed trees, branches, roots and other excess materials shall be removed from the construction site to an approved landfill at the expense of the Contractor.

1.20 SITE CLEANUP

A. The Contractor shall keep the working area free at all times of tools, materials and equipment not essential to the progress of the Work. Debris, waste materials, and rubbish shall be properly disposed of and not allowed to accumulate. If the Contractor should fail to do this, the City will make the necessary arrangements to effect the cleanup by others and will back charge the cost to the Contractor. If such action becomes necessary on the part of and in the opinion of the City, the City will not be responsible for the inadvertent removal of material which the Contractor would not have disposed of had he effected the required cleanup.

B. Where material or debris has washed or flowed into or been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as result of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed

of during progress of the Work, and the ditches, channels, drains etc., kept in a clean and neat condition.

C. On or before the completion of the Work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations, in a neat and satisfactory condition.

D. The Contractor shall restore the entire project site to its original or better condition, with the exception of any area(s) designated for alteration by the Contract Documents. The Contractor shall restore or replace; when and as directed, any public or private property damaged by his work, equipment, or employees to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration.

E. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors and on completion of the Work shall deliver it undamaged and in fresh and new appearing condition.

1.21 LAWS AND REGULATIONS

A. It shall be the responsibility of the Contractor to give all notices and comply with all the laws, rules, regulations, ordinances, etc., that may be applicable at the time the Work is started on the project. Should the Contractor discover the Drawings or Specifications are contradictory to, or in variance with the above, he shall notify the Engineer immediately, in writing, in order that any required changes or modifications can be made. It is not the Contractor's responsibility to make certain that the Drawings or Specifications are in non-compliance with any of the above; however, should he be aware of any existing discrepancy, or have reason to believe such may exist and performs work without proper notice to the Engineer, the Contractor shall be responsible for any cost involved in making the necessary alterations or corrections.

1.22 CONTRACTOR'S USE OF PREMISES, STAGING AND STORAGE

A. All project construction work will be accomplished on the City's property, public/private rights-of-way/easements or within temporary construction easements and the Contractor shall confine his activity to those designated areas. The Contractor shall not enter upon private property for any reason without securing prior permission from the property City. Such permission, including any stipulations, shall be in writing and a copy shall be delivered to the Engineer prior to the Contractor's entry or occupation of the subject property. This requirement will be rigidly enforced, particularly with regard to the utilization of vacant areas adjacent to the work site for the storage of materials or parking equipment.

B. The Contractor shall perform his work in such manner that he will not damage adjacent public or private property. Any damage to existing physical structures or utility services shall be repaired or restored promptly at no expense to the City.

C. The Contractor shall avoid damage to and preserve all existing vegetation (grass, shrubs, trees, etc.) on or near the work area which do not, within reason, interfere with construction. The Contractor will be responsible for and required to replace or restore all such vegetation damaged or destroyed at no cost to the City. The Contractor will also be responsible for any unauthorized cutting or damage to trees, shrubs, etc., and also damage caused by careless operation of equipment, storage of materials and rutting or tracking of grass by equipment.

D. The Contractor shall conduct access, hauling, filling, and storage operations as specified herein and as shown on the Contract Drawings.

1. On-site borrow areas are designated as follows: Suitable material, as approved by Engineer, from excavations for project structures. Any additional borrow material required shall be provided by the Contractor from off-site.

2. On-site spoil areas will become property of the Contractor and are to be disposed off-site.

E. The lands upon which the Work is to be performed, rights-of-way for access thereto are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor.

F. 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. Project sign requirements are provided in Section 01590

G. The City shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements, and those other lands which are

designated for the use of Contractor. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the City except for temporary construction easements, which are the responsibility of the Contractor to obtain and pay for, unless otherwise provided in the Contract Documents. Any additional lands, rights-of-way and easements not furnished by the City that Contractor deems necessary, including but not limited to requirements for temporary construction facilities, access and egress, or for storage, shall be obtained by Contractor at no increase in Contract Price or extension in Contract Time, and Contractor shall confine his operations to those areas furnished or obtained at its expense.

H. Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workmen to areas permitted by Laws and Regulations, rights-of-way, permits and easements or the requirements of the Contract Documents, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such property, or to the owner or occupant thereof or of any other property, caused or alleged to have been caused by or incident to the execution of this Work. Contractor shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify, defend and hold the City and Engineer harmless from and against all claims, damages, losses and expenses (including but not limited to charges of engineers, architects and other professionals, and attorneys' fees and attorneys' fees on appeal and all costs of defense or appeal) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against the City, Design Engineer or Engineer to the extent based on a claim arising out of Contractor's performance of the Work.

I. Construct all fill areas so runoff will not flood improved areas.

J. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation, cooperation, and coordination with the City. Occasionally such connections may have to be made during off-peak hours (late night, early morning, or weekend hours). The Contractor shall give a minimum of 72 hours' notice to the City when tie-ins with the existing plant utilities are required.

K. For major utility pipeline tie-ins and relocations, the Contractor shall submit a detailed Plan of Action for review and approval by the City and the Engineer. No major utility relocation or tie-ins shall proceed until the Plan of Action for that Work is approved.

L. Contractor is fully responsible for all restoration of all staging and storage areas to equal or better condition than what the areas were originally found.

1.23 HAZARDOUS LOCATIONS

A. The Contractor shall be responsible for identification of hazardous locations, appropriate construction methods, and all other safety issues.

1.24 ADDITIONAL PROVISIONS

A. The Contractor shall provide at his own cost all necessary temporary facilities for access to, and for protection of, all existing structures. The Contractor is responsible for all damage to existing structures, equipment, and facilities caused by his construction operations, and must repair all such damage when and as ordered by the Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION

A. A mandatory preconstruction meeting will be held to acquaint representatives of the City and various other agencies with those in responsible charge of the Contractor's activities for the project. Unless otherwise directed by the City, no construction activities relating to this contract shall commence until after the pre-construction meeting is adjourned, and until any pending business from the meeting has been addressed by the Contractor to the satisfaction of the City and Engineer. The meeting may cover such subjects as the following or other deemed pertinent by the City and Engineer:

1. Insurance certificates.
2. Permits and licenses.
3. Affirmative action employment.
4. Construction schedules.
5. Cost breakdown and applications for payment.
6. Material deliveries, storage and payments.
7. Shop drawings and submittals.
8. Job-site inspection by the Engineer.
9. Safety and emergency action procedures.
10. Operations of the existing utilities.
11. Field offices, security and other housekeeping procedures.
12. List of subcontractors.
13. Liquidated damages.
14. Communications.
15. Coordinating.
16. All other appropriate matters.

1.02 PROGRESS

A. A progress meeting shall be held on a once-per-month basis for the purpose of coordinating and expediting the work. The Contractor, as a part of his obligations under the Contract, shall attend in person or by an authorized representative to attend and to act on his behalf. The City's Construction Manager, in conjunction with the Engineer, will conduct such meetings and as necessary, with the Contractor's input, issue an agenda.

B. In addition, the City's Construction Manager or Contractor may call for special job site meetings for the purpose of resolving unforeseen problems or conflicts which may impede the construction schedule. The City will prepare a brief summary report of the decisions or understandings concerning each of the items discussed at the meeting.

C. At weekly progress meetings, the Contractor shall submit to the Engineer for review a look back schedule for work completed within the last three (3) weeks, a current look ahead schedule for the work anticipated to be completed within the next three (3) weeks, and an overall project progress schedule. See Section 01310 for detailed specifics.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Promptly after award of the Contract, prepare and submit to the Engineer estimated construction progress schedules demonstrating complete fulfillment of all Contract requirements utilizing a Critical Path Method (hereinafter referred to as CPM) in planning, coordinating, and performing the Work under this Contract (including all activities of subcontractors, equipment vendors, and suppliers). The principles and definition of CPM terms used herein shall be as set forth in the Associated General Contractors of America (AGC) publication, Construction Planning & Scheduling Manual, latest edition, but the provisions of this Specification shall govern the planning, coordinating, and performance of the Work.

2. Submit revised progress schedules on a monthly basis. No partial payments shall be approved until there is an approved construction progress schedule on hand.

B. Related Requirements Described Elsewhere:

1. Summary of Work: Section 01010.

2. Project Meetings: Section 01200.

3. Shop Drawings: Section 01340.

4. Schedule of Values: Section 01370.

1.02 QUALIFICATIONS

A. A statement of computerized CPM capability shall be submitted in writing prior to the award of the Contract and shall verify that either Contractor's organization has in-house capability to use the CPM technique or that Contractor will employ a CPM consultant who is so qualified.

B. In-house capability shall be verified by description of construction projects to which Contractor or Contractor's consultant has successfully applied computerized CPM and shall include at least two (2) projects valued at least half the expected value of this project.

1.03 FORM OF SCHEDULES

A. Prepare schedules in the form of a horizontal bar chart.

1. Provide a separate horizontal bar for each trade or operation within each structure or item.

2. Horizontal time scale:

a. Show starting and completion dates for each activity in terms of the number of days after Notice to Proceed. All completion dates shown shall be within the period specified for contract completion.

b. Identify the first work day of each month.

3. Scale and Spacing: Sufficient to allow space for notations and future revisions.

4. Maximum Sheet Size: 24 inches by 36 inches.

B. Format of Listings: The chronological order of the start of each item of work for each structure.

C. Identification of Listings: By major specification section numbers as applicable and by structure.

D. Construction Progress Schedules shall be computer generated using software equal to Primavera Project Planner for Windows by Primavera Systems, Inc., Microsoft Project, or approved equal.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity and by structure.

2. Show the dates for the beginning and completion of each major element of construction in no more than a two (2) week increment scale. Specifically list, but do not limit to:

a. Shop Drawing Schedule.
b. Installation of temporary facilities.
c. Site clearing.
d. Site utilities.
e. Structural framing.
f. Subcontractor work.
g. Equipment installations.
h. Painting.
i. Testing.
j. Project closeout.

3. Show projected percentage of completion for each item, as of the first day of each month.

4. Show projected dollar cash flow requirements for each month of construction and for each activity as indicated by the approved Schedule of Values.

B. Submittals for construction progress schedules shall be in accordance with Section 01340: Shop Drawings. Indicate on the schedule the following:

1. The dates for Contractor's submittals.

2. The dates submittals will be required for Owner-furnished products, if applicable.

3. The dates approved submittals will be required from the Engineer.

C. A typewritten list of all long lead items as applicable (equipment, materials, etc.).

D. To the extent that the progress schedule or any revised progress schedule shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by the Engineer. Failure to include any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the Engineer's approval of the progress schedule.

E. Scheduling Constraints: The work within Owner's property must be completed within the maximum number of days start to finish, as indicated in the Contract. Additionally, work must proceed on a continuous basis, without stoppages, except for nights and weekends. There shall be no lapses between phases of construction.

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope.

2. Activities modified since previous submission.

3. Revised projections of progress and completion.

4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.

2. Corrective action recommended, and its effect.

3. The effect of changes on schedules of other prime contractors.

D. If the Work falls behind the critical path schedule by two (2) weeks or more, the Contractor shall prepare a recovery schedule.

1.06 SUBMISSIONS

A. Submittal Requirements.

1. Logic network and/or time-phased bar chart, computer generated.

2. Computerized network analysis:

a. Sort by early start
b. Sort by float
c. Sort by predecessor/successor

3. Narrative description of the logic and reasoning of the schedule.

B. Time of Submittals.

Within ten (10) working days after Notice to Proceed, Contractor shall submit a network diagram describing the activities to be accomplished in the project and their dependency relationships, (predecessor/successor) as well as a tabulated schedule as herein defined. The total length of time indicated on the initial CPM schedule shall equal the exact number of days in the Contract Time as defined in the Agreement with the Owner. The schedule produced and submitted shall also indicate calendar dates, including project starting and completion dates, based on the Contract Commencement and completion dates indicated in the Notice to Proceed. The Engineer will review the complete schedule within a timely fashion and provide comments as they see fit. It is the Contractor's responsibility to submit an accurate, detailed representation of the project work and timelines required for the actual effort. During the review process, the Engineer may meet with a representative of Contractor to review the proposed plan and schedule to discuss any clarifications that may be necessary.

C. Within ten (10) working days after the conclusion of the Engineer's review period, Contractor shall revise the network diagram as required and resubmit the network diagram and a tabulated schedule produced therefrom. The revised network diagram and tabulated schedule shall be reviewed and accepted or rejected by the Engineer within fifteen (15) working days after receipt. The network diagram and tabulated schedule, when accepted by the Engineer, shall constitute the project work schedule unless a revised schedule is required due to substantial changes in the Work, a change in Contract Time or a recovery schedule is required and requested.

D. Acceptance. The finalized schedule will be acceptable to the Engineer when, in the opinion of the Engineer, it demonstrates an orderly progression of the Work to completion in accordance with the Contract Documents. Such acceptance will neither

impose on the Engineer responsibility for the progress or scheduling of the Work nor relieve Contractor from full responsibility therefore. The finalized schedule of shop drawing submittals will be acceptable to the Engineer when, in the opinion of the Engineer, it demonstrates a workable arrangement for processing the submittals in accordance with the requirements. The finalized Schedule of Values (lump sum price breakdown), as applicable, will be acceptable to the Engineer as to form and content when, in the opinion of the Engineer, it demonstrates a substantial basis for equitably distributing the Contract Price. When the network diagram and tabulated schedule have been accepted, the Contractor shall submit to the Engineer six (6) copies of the time-scaled network diagram, six (6) copies of a computerized tabulated schedule in which the activities have been sequenced by numbers, six (6) copies of a computerized tabulated schedule in which the activities have been sequenced by early starting date, and six (6) copies of a computerized, tabulated schedule in which activities have been sequenced by total float, and six (6) copies sorted by predecessor/successor.

E. Revised Work Schedules. Contractor, if requested by the Engineer, shall provide a revised work schedule if, at any time, the Engineer considers the completion date to be in jeopardy because of "activities behind schedule." The revised work schedule shall include a new diagram and tabulated schedule conforming to the requirements of Paragraph 1.09 herein, designed to show how Contractor intends to accomplish the Work to meet the completion date. The form and method employed by Contractor shall be the same as for the original work schedule. No payment will be made if activities fall more than two (2) weeks behind schedule and a revised work schedule is not furnished.

F. Schedule Revisions. The Engineer may require Contractor to modify any portions of the work schedule that become infeasible because of "activities behind schedule" or for any other valid reason. An activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule. No change may be made to the sequence, duration, or relationships of any activity without approval of the Engineer.

1.07 DISTRIBUTION

A. Distribute copies of the reviewed schedules to:

1. Engineer.
2. Jobsite file.
3. Subcontractors.
4. Other concerned parties.
5. Owner (two copies).

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

1.08 CHANGE ORDERS

A. Upon approval of a change order, the approved changes shall be reflected in the next scheduled revision or update submittal of the construction progress schedule by the Contractor.

1.09 CPM STANDARDS

A. CPM, as required by this Section, shall be interpreted to be generally as outlined in the Associated General Contractor's (AGC) publication, Construction Planning & Scheduling Manual, latest edition.

B. Work schedules shall include a graphic network and computerized, tabulated schedules as described below. To be acceptable the schedule must demonstrate the following:

1. A logical succession of work from start to finish.

2. Definition of each activity. Activities shall be identified by major specification section numbers, as applicable, and by major structure.

3. A logical flow of work crews/equipment (crews are to be defined by manpower category and man-hours; equipment by type and hours).

4. Show all work activities and interfaces including submittals as well as major material and equipment deliveries.

C. Networks.

1. The CPM network, or diagram, shall be in the form of a time-scaled diagram of the customary activity-on-type and may be divided into a number of separate pages with suitable notation relating the interface points among the pages. Notation on each activity line shall include a brief work description and a duration, as described in Paragraph 1.09, D. herein.

2. All construction activities and procurement shall be indicted in a time-scaled format, and a calendar shall be shown on all sheets along the entire sheet length. Each activity arrow shall be plotted so the beginning and completion dates of said activity can be determined graphically by comparison with the calendar scale. All activities shall be shown using the symbols that clearly distinguish between critical path activities, non-critical path activities, and float for each non-critical activity. All non-critical path activities shall show estimated performances time and float time in scaled form.

D. The duration indicated for each activity shall be in calendar days and shall represent the single best time considering the scope of the work and resources planned for the activity including time for inclement weather. Except for certain non-labor activities, such as curing concrete or delivering materials, activity durations shall not exceed fourteen (14) days nor be less than one (1) day unless otherwise accepted by the Engineer.

E. Tabulated Schedules. The initial schedule shall include the following minimum data for each activity.

1. Activity Beginning and Ending Numbers (i-j numbers) (single activity numbers may be used).

2. Duration.

3. Activity Description.

4. Early Start Date (Calendar Dated).

5. Late Start Date (Calendar Dated).

6. Early Finish Date (Calendar Dated).

7. Late Finish Date (Calendar Dated).

8. Identified Critical Path.

9. Total Float (Note: No activity may show more than 20 days float).

10. Cost of Activity.

11. Equipment Hours, by type; Man-Power Hours, by crew or trade.

F. Project Information. Each tabulation shall be prefaced with the following summary data.

1. Project Name.

2. Contractor.

3. Type of Tabulation (Initial or Updated).

4. Project Duration.

5. Project Scheduled Completion Date.

6. Effective or Starting Date of the Schedule.

7. New Project Completion Date and Project Status (if an updated or revised schedule).

8. Actual Start Date and Actual Finish Date (for all updated schedules.)

1.10 SCHEDULE MONITORING

A. At not less than monthly intervals or when specifically requested by Engineer, Contractor shall submit to the Engineer a computer printout of an updated schedule for those activities that remain to be completed. Typically, the updated schedule will be submitted with the application for payment as specified below.

B. The updated schedule shall be submitted in the form, sequence, and number of copies requested for the initial schedule.

1.11 PROGRESS MEETINGS

For the monthly progress meeting, Contractor shall submit a revised CPM schedule and a three-week look-ahead schedule, showing all activities completed, in progress, uncompleted, or scheduled to be worked during the weeks. The three weeks include the current week plus the next two weeks. All activities shall be from the approved CPM and must be as shown on the CPM unless behind or ahead of schedule. One copy of the revised CPM schedule shall be submitted with each copy of that month's application for payment, six (6) copies minimum.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01340

SHOP DRAWINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall submit to the Engineer for review and approval, such Shop Drawings, Test Reports, and Product Data on materials and equipment (hereinafter in this Section called Data), and material samples (hereinafter in this Section called Samples) as are required for the proper control of work, including but not limited to those Shop Drawings, Data, and Samples for materials and equipment specified elsewhere in the Specifications and in the Drawings.

2. Within fourteen (14) calendar days after the Notice to Proceed, the Contractor shall submit to the Engineer a complete list of preliminary Data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Contract Documents. This procedure is required in order to expedite final review of Shop Drawings.

3. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:

   a. Submittal description and number assigned.
   b. Date to Engineer.
   c. Date returned to Contractor (from Engineer).
   d. Status of submittal (Approved, Approved as Noted, Amend and Resubmit, and Rejected).
   e. Date of resubmittal and return (as applicable).
   f. Date material release (for fabrication).
   g. Projected date of fabrication.
   h. Projected date of delivery to site.
   i. Status of O&M manuals submittal.
   j. Specification Section.
   k. Drawings sheet number.

B. Related Requirements Described Elsewhere:

1. General Conditions and Supplementary Conditions (as applicable).

2. Shop Drawing Submittal Form.

3. Construction Progress Schedules: Section 01310.

4. Project Record Documents: Section 01720.

1.02 CONTRACTOR'S RESPONSIBILITY

A. It is the responsibility of the Contractor to check all drawings, data and samples prepared before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents. If the Contractor takes exception to the specifications, the Contractor shall note the exception in the letter of transmittal to the Engineer.

B. Determine and verify:

1. Field measurements.

2. Field construction criteria

3. Catalog numbers and similar data.

4. Conformance with Specifications.

C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning and ending of manufacture, testing, and installation of materials, supplies, and equipment. This schedule shall indicate those that are critical to the progress schedule.

D. The Contractor shall not begin any of the work covered by a Shop Drawing, Data, or a Sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, with approval.

E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking and appropriate action from the time the Engineer receives them.

F. All submittals shall be accompanied with a transmittal letter prepared in duplicate containing the following information:

1. Date.

2. Project Title and Number.

3. Contractor's name and address.

4. The number of each Shop Drawings, Project Data, and Sample submitted.

5. Notification of Deviations from Contract Documents.

   a. The Contractor shall indicate in **bold type** at the top of the cover sheet of submittal of shop drawing if there is a deviation from the Drawings, Specifications, or referenced specifications or codes.

   b. The Contractor shall also list any deviations from the Drawings, Specifications, or referenced specifications or codes and identify in green ink prominently on the applicable Shop Drawings.

6. Submittal Log Number conforming to Specification Section Number.

G. The Contractor shall submit seven (4) copies of descriptive or product data information and Shop Drawings to the Engineer plus the number of copies which the Contractor requires returned. All blueprint Shop Drawings shall be submitted with one (I) set of PDF reproducible and the same number of prints as Shop Drawings, plus the number of copies which the Contractor requires returned. The Engineer will review the blueprints and return to the Contractor the set of marked-up PDF reproducible with appropriate review comments.

H. The Contractor shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of Work prior to the completion of the review by the Engineer of the necessary Shop Drawings.

I. The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposes to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of the Drawings and Specifications.

J. The Contractor shall not use Shop Drawings as a means of proposing alternate items to demonstrate compliance with the Drawings and Specifications.

K. Each submittal will bear a stamp indicating that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal as illustrated below, or similar encompassing the information below, as approved by the Owner and Engineer.

(OWNER'S NAME)
(PROJECT NAME)
(PROJECT NUMBER)

SHOP DRAWING NO.:_____

SPECIFICATION SECTION:_____ DRAWING NO._____

WITH RESPECT TO THIS SHOP DRAWING OR SAMPLE, I HAVE DETERMINED AND VERIFIED ALL QUANTITIES, DIMENSIONS, SPECIFIED PERFORMANCE CRITERIA, INSTALLATION REQUIREMENTS, MATERIALS, CATALOG NUMBERS, AND SIMILAR DATA WITH RESPECT THERETO AND REVIEWED OR COORDINATED THIS SHOP DRAWING OR SAMPLE WITH OTHER SHOP DRAWINGS AND SAMPLES AND WITH THE REQUIREMENTS OF THE WORK AND THE CONTRACT DOCUMENTS.

_____ NO VARIATION FROM CONTRACT DOCUMENTS

_____ VARIATION FROM CONTRACT DOCUMENTS AS SHOWN

(CONTRACTOR'S NAME)
(CONTRACTOR'S ADDRESS)

BY: _____DATE:_____
AUTHORIZED SIGNATURE

L. Drawings and schedules shall be checked and coordinated with the work of all trades and sub-contractors involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of Shop Drawings, Data, and Samples as submitted by the Contractor will be to determine if the items(s) generally conforms to the information in the Contract Documents and is compatible with the design concept. The Engineer's review and exceptions, if any, will not constitute an approval of dimensions, connections, quantities, and details of the material, equipment, device, or item shown.

B. The review of drawings and schedules will be general, and shall not be construed:

1. As permitting any departure from the Contract Documents.

2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials.

2. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract Documents which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or contract time, the Engineer may return the reviewed drawings without noting an exception.

D. "Approved As Noted" - Contractor shall incorporate Engineer's comments into the submittal before release to manufacturer. The Contractor shall send a letter to the Engineer acknowledging the comments and their incorporation into the Shop Drawing.

E. "Amend And Resubmit" - Contractor shall resubmit the Shop Drawing to the Engineer. The resubmittal shall incorporate the Engineer's comments highlighted on the Shop Drawing.

F. "Rejected" - Contractor shall correct, revise and resubmit Shop Drawing for review by Engineer.

G. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.

H. If the Contractor considers any correction indicated on the drawings to constitute a change to the Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

I. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items for:

1. Systems.

2. As indicated in specific Specifications Sections.

All drawings, schematics, manufacturer's product Data, certifications, and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interface review.

K. Only the Engineer shall utilize the color "red" in marking Shop Drawing submittals.

L. Shop drawing and submittal data shall be reviewed by the Engineer for each original submittal and first resubmittal; thereafter review time for subsequent resubmittals shall be charged to the Contractor and the Contractor shall reimburse the Owner for services rendered by the Engineer as specified in the Supplementary Conditions.

1.04 SHOP DRAWINGS

A. When used in the Contract Documents, the term "Shop Drawing" shall be considered to mean Contractor's plans for materials and equipment which become an integral part of the Project. Shop Drawings shall be complete and detailed and shall consist of fabrication, erection, setting and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams. Catalogs cuts, catalogs, pamphlets, descriptive literature, and performance and test data shall be considered only as supportive information to required Shop Drawings as defined above. As used herein, the term "manufactured" applies to standard units usually mass-produced; and "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements.

B. Manufacturer's catalog sheets, brochures, diagrams, illustrations, and other standard descriptive data shall be clearly marked to identify pertinent materials, products, or models. Delete information which is not applicable to the Work by striking or cross-hatching.

C. Each Shop Drawing shall be submitted with an 8-1/2" by 11" cover sheet which shall include a title block for the submittal. Each Shop Drawing cover sheet shall have a blank area 3-1/2 inches high by 4-1/2 inches wide, located adjacent to the title block. The title block/cover sheet shall display the following:

1. Project Title and Number.

2. Name of project building or structure.

3. Number and title of the Shop Drawing.

4. Date of Shop Drawing or revision.

5. Name of Contractor and subcontractor submitting drawing.

6. Supplier/manufacturer.

7. Separate detailer when pertinent.

8. Specification title and Section number.

9. Applicable Drawing number.

D. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog data sheets, catalog cuts, performance curves, diagrams, verification of conformance with applicable standards or codes, materials of construction, and similar descriptive material. Materials and equipment lists shall give, for each item

thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish, and all other pertinent Data.

E. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, and address, and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.

F. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the Work in accordance with the Contract, even though such drawings have been reviewed.

G. All manufacturers or equipment suppliers who propose to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five (5) installations where identical equipment has been installed and has been in operation for a period of at least two (2) years unless specified otherwise in the Specification Section applicable.

1.05 WORKING DRAWINGS

A. When used in the Contract Documents, the term "Working Drawings" shall be considered to mean the Contractor's plan for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and falsework for underpinning, and for such other work as may be required for construction but does not become an integral part of the Project.

B. Copies of working drawings as noted in paragraph 1.05 A. above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for the Work.

C. Working Drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida, and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks to new or existing work are assumed by the Contractor; the Owner and Engineer shall have no responsibility therefor.

1.06 SAMPLES

A. The Contractor shall furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the

Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in the Work until approved by the Engineer.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.

2. Full range of color, texture, and pattern.

3. A minimum of three (3) samples of each item shall be submitted.

C. Each sample shall have a label indicating:

1. Name of Project.

2. Name of Contractor and subcontractor.

3. Material or equipment represented.

4. Place of origin.

5. Name of producer/supplier and brand (if any).

6. Location in Project.

7. Submittal and specification numbers.

(Samples of finished materials shall have additional marking that will identify them under the finished schedules.)

D. The Contractor shall prepare a transmittal letter and a description sheet for each shipment of samples. The description sheet shall contain the information required above. He shall enclose a copy of the letter and description sheet with the shipment and send a copy of the letter and description sheet to the Engineer. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

E. Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the Work. Approved Samples of the hardware in good condition will be marked for identification and may be used in the Work. Materials and equipment incorporated in the Work shall match the approved Samples. Samples which failed testing or were not approved will be returned to the Contractor at his expense, if so requested at time of submission.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Submit to the Engineer an itemized Schedule of Values, corresponding to the bid items, which totals the bid amount for the Work, at the Pre-Construction Conference, and as otherwise specified or requested to be submitted earlier as evidence of the Apparent Low Bidder's qualifications.

2. Upon request of the Engineer support for the values will be provided with data which will substantiate their correctness. The data shall include, but not be limited to quantity of materials, all sub-elements of the activity, and their units of measure.

3. The combined Schedule of Values and the individual Schedule of Values for each site at which work is performed shall establish the actual value for each activity of the Work to be completed taken from the approved Critical Path Method (CPM) Construction Schedule, and shall be used as the basis for the Contractor's Applications for Payment.

B. Related Requirements Described Elsewhere:

1. Conditions of the Construction Contract.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule on 8-1/2 inch x 11 inch white paper. Contractor's standard forms and computer printouts may be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of project and location.

2. Owner and purchase order number.

3. Engineer and project number.

4. Name and address of Contractor.

5. Contract designation.

6. Date of submission.

B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing item prices for progress payments during construction.

C. Identify each line item with the number and the title of the respective section of the Specifications.

D. For each major item of the Work, list sub-values of major products or operations under the major item.

E. For the various portions of the Work:

1. The amount for each item shall reflect a total installed cost including a directly proportional amount of the Contractor's overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:

a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials. Payment for materials shall be limited to the invoiced amount only.

b. The total installed value.

F. Round off figures to nearest dollar amount.

G. The sum of the costs of all items listed in the schedule shall equal the total Contract Price.

H. For each item which has an installed value of more than $15,000, provide a breakdown of costs to list major products or operations under each item.

1.03 SUBSCHEDULE OF UNIT MATERIAL VALUES

A. Submit a separate schedule of unit prices for materials to be stored on site and for those materials incorporated into the Work for which progress payments will be requested.

B. Format shall be as acceptable to the City and Engineer.

C. The unit values for the materials shall be broken down into:

1. Cost of the material, delivered and unloaded at the site, with taxes paid.

2. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.

D. Only materials unique to the project may be billed when stored on site. Materials of standard use such as conduit, wire, small-diameter pipe, steel, etc., shall not be accepted for payment.

E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

1.04 REVIEW AND RESUBMITTAL

A. After review by Engineer, revise and resubmit Schedule of Values and Schedule of Unit Material Values as required.

B. Resubmit revised schedules in same manner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall employ a professional photographer to take digital construction record photographs for pre-construction conditions periodically during course of Work and post-construction.

1.02 RELATED SECTIONS

A. Section 01720 - Project Record Documents

B. Other Sections as applicable.

1.03 PHOTOGRAPHY REQUIRED

A. View and Quantities Required:

1. Take a minimum of 24 images of each site and adjacent property at the following intervals:

a. Pre-construction

b. Monthly, or other interval, at the cut-off date in accordance with Applications for Payment.

c. At construction events or discoveries as directed by the Owner or Engineer.

d. At post-construction.

B. Aerial photography shall be required in addition to ground level images for items out of sight of ground level photography.

C. Photograph from locations to adequately illustrate condition of construction and state of progress.

D. At successive periods of photography, take at least one photograph from the same overall view as previously.

E. Consult with the Owner and Engineer at each period of photography for instructions concerning views required.

PART 2 - PRODUCTS

2.01 CAMERA REQUIREMENT

A. A Digital Single Lens Reflex (DLSR) is required.

B. Point and shoot, mobile phones and disposal cameras are not acceptable.

2.02 PHOTOGRAPHS

A. The minimum file size is 6.0 megapixels per image.

B. All images shall be color and in RGB format.

C. Acceptable file formats include:

1. Tagged Information File Format (TIFF)
2. Joint Photographic Experts Group 2000 (JPEG2000)
3. Digital Negative (DGN)

D. Unacceptable file formats include:

1. Bitmap (BMP)
2. Graphics Interchange Format (GIFF)
3. Portable Network Graphic (PNG)
4. RAW format.

2.03 METADATA

A. Each image must contain descriptive metadata as follows:

a. Name of Project
b. Orientation of View
c. Date and time of image
d. Name and address of photographer
e. Photographer's numbered identification of image.
f. Meaningful and descriptive filenames unique to each image.

2.04 COPYRIGHT

A. No copyrighted photographs will be accepted.

2.05 EDITING

A. Images shall not be edited in any way.

2.06 TECHNIQUE

A. Factual presentation

B. Magnification commensurate with the level of detail required.

C. Correct image and focus

1. High resolution and sharpness
2. Maximum depth-of-field
3. Minimum distortion

2.07 DELIVERY OF IMAGES

A. Deliver electronic image file to the Owner and Engineer to accompany each Application for Payment or as directed.

B. Electronic file storage media shall be a durable, commercial quality USB memory device of sufficient capacity to store the intended contents.

C. Electronic file storage media shall be labeled and identified by project title and project number.

D. The photographer shall keep electronic copies for a minimum of two years from Owner acceptance.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01390

COLOR DVD
PRECONSTRUCTION RECORD

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Prior to commencing work, the Contractor shall have a continuous color DVD recording taken along the entire length of the Project and at all proposed construction sites within the Project area to serve as a record of pre-construction conditions. Pump station and valve vault hatches and manhole covers are to be opened or removed and the existing conditions shall be videoed by the Contractor, in coordination with City representatives.

B. Contractor to lay out Project along with pipe alignment and station points prior to videoing.

1.02 QUALITY ASSURANCE

A. The Contractor shall engage the services of a professional electrographer. The color DVD shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business or preconstruction color DVD documentation.

B. The electrographer shall furnish to the Engineer a list of all equipment to be used for the DVD, i.e., manufacturer's name, model number, specifications and other pertinent information.

C. Additional information to be furnished by the electrographer are the names and addresses of two references that the electrographer has performed color DVD for, on projects of a similar nature, within the last 12 months.

D. Owner's Representative must be present during filming. Provide Owner forty-eight (48) hours' notice prior to start of filming.

E. No construction shall begin prior to review and approval of the DVD covering the construction area by the Owner and Engineer. The Engineer shall have the authority to reject all or any portion of a DVD not conforming to specifications and order that it be redone at no additional charge.

F. The Contractor shall reschedule unacceptable coverage within five (5) days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the DVD coverage.

G. DVD shall not be made more than ninety (30) days prior to construction in any area. All DVDs and written records shall become property of Owner.

PART 2 - PRODUCTS

2.01 DVD

A. DVD shall be new. Reprocessed DVDs will not be acceptable.

PART 3 - EXECUTION

3.01 EQUIPMENT

A. All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor.

B. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion and interruptions.

C. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be more than ten (10) feet. In some instances, DVD coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or-special conveyance provided by the Contractor.

D. The color video camera used in the recording system shall have a horizontal resolution of 700 lines at center, minimum pixels 1,370 x 744, a luminance signal to noise ratio of 45 dB and a minimum illumination requirement of one (1) foot candle.

3.02 RECORDED INFORMATION - AUDIO

A. Each DVD shall begin with the current date, project name and municipality and be followed by the general location, i.e., viewing side and direction of progress. The audio track shall consist of an original live recording. The recording shall contain the narrative commentary of the electrographer, recorded simultaneously with his fixed elevation video record of the zone of influence of construction.

B. The Owner and Engineer reserve the right to supplement the audio portion of the DVD as deemed necessary. A representative of the Owner or Engineer shall be selected to provide such narrative.

3.03 RECORDED INFORMATION - VIDEO

A. All video recordings shall, by electronic means, display on the screen the time of day, the month, day and year of the recording. This time and date information must be continuously and simultaneously generated with the actual recording.

B. Each DVD shall have a log of that DVD's contents. The log shall describe the various segments of coverage contained on that DVD in terms of the names of streets or easements, coverage beginning and end, directions of coverage, video unit counter numbers, engineering stationing numbers and the date.

3.04 LIGHTING

A. All video shall be done during time of good visibility. No recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.

3.05 SPEED OF TRAVEL

A. The rate of speed in the general direction of travel of the vehicle used during recording shall not exceed 44 feet per minute. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object.

3.06 AREA OF COVERAGE

A. Video coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing driveways, sidewalks, curbs, pavements, ditches, mailboxes, landscaping, culverts, fences, signs, and headwalls within the area covered, all the way to the right-of-way line and include station points and addresses.

END OF SECTION

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SECTION 01400

TESTING AND INSPECTION

PART 1 – GENERAL

A. All testing and inspection will be in accordance with the General Conditions.

B. The work or actions of the testing laboratory shall in no way relieve the Contractor of his obligations under the Contract. The laboratory testing work will include such inspections and testing required by the Contract Document, existing laws, codes, ordinances, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform or approve any of the Contractor's work.

C. The Contractor shall allow the Engineer ample time and opportunity for testing materials and equipment to be used in the work. He shall advise the Engineer promptly upon placing orders for materials and equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The Contractor shall at all times furnish the Engineer and his representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The Contractor must anticipate that possible delays may be caused him in the execution of his work due to the necessity of materials and equipment being inspected and accepted for use. The Contractor shall furnish, at his own expense, all samples of materials required by the Engineer for testing, and shall make his own arrangement for providing water, electric power, or fuel for the various inspections and tests of structures and equipment. As a minimum, 24-hours advance written notice shall be provided by the Contractor for rebar, structural and similar inspections by the Engineer. The amount of time required for advance written notice by the Contractor to the Engineer for other inspections depends upon other factors and shall be solely at the Engineer’s discretion.

D. The Contractor shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other sections of the Specifications. The Contractor shall also place his orders for such equipment on the basis that, after the equipment has been tested prior to final acceptance of the work, the manufacturer will furnish to the City the certified statements that the equipment has been installed properly and is ready to be placed in functional operation. Tests and analyses required of equipment shall be paid for by the Contractor, unless specified otherwise in the section which covers a particular piece of equipment.

E. The Contractor will bear the cost of all additional tests, inspections, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such test, inspection, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such test, inspections, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the City for said cost. The cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01410

QUALITY CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the Contractors minimum responsibilities in meeting the quality requirements of the Contract Documents.

1.02 RELATED SECTIONS

A. Section 01050 – Field Engineering and Surveying

B. Other Sections as applicable.

1.03 OBSERVATION AT PLACE OF MANUFACTURE

A. Unless otherwise specified, all products, materials, and time and equipment shall be subject to observation by the Owner and the Engineer at the place of manufacture.

B. The presence of the Owner and/or the Engineer at the place of manufacture however, shall not relieve the Contractor of the responsibility for furnishing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor.

C. The Contractor shall advise the Owner and Engineer promptly upon placing orders for materials and equipment so that arrangements may be made, if desired, for observation before shipment from the place of manufacture.

D. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contractor Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

1.04 SAMPLING AND TESTING

A. Unless otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered.

B. The Owner and the Engineer reserve the right to use any generally accepted system of sampling and testing which will insure the quality of the workmanship is in full accord with the Contract Documents.

C. Any waiver by the Owner or Engineer of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements.

D. The Owner and Engineer reserve the right to make independent investigations and tests at any time

E. Failure of any portion of the Work to meet any of the requirements of the Contract Document shall be reasonable cause for the Owner or Engineer to require the removal or correction and reconstruction of any such Work at the cost of the Contractor.

1.05 SITE INVESTIGATION AND CONTROL

A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to its failure to comply with this requirement.

B. The Contractor shall inspect related and appurtenant work, and shall report in writing to the Owner and Engineer any conditions that will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor at its cost.

1.06 OBSERVATION AND TESTING

A. The work or actions of the testing laboratory shall in no way relieve the Contractor of its obligations under the Contract. The laboratory testing work will include such observations and testing required by the Owner or Engineer. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform, accept or approve any of the Contractor's Work.

B. The Contractor shall allow the Owner and Engineer ample time and opportunity for field observation and testing materials and equipment to be used in the Work.

C. The Contractor shall at all times furnish the Owner and the Engineer facilities, including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship.

D. The Contractor must anticipate that possible delays may occur in the execution of its work due to the necessity of materials and equipment being inspected and accepted for use.

E. The Contractor shall furnish, at its own expense, all samples of materials required by the Owner or Engineer for testing, and shall make its own arrangements for providing water, electric power, or fuel for the various observations and tests of structures and equipment.

1.07 RIGHT OF REJECTION

A. The Owner and Engineer, shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site.

B. If the Owner or its representative, through an oversight or otherwise, has accepted materials or work which is defective or which is contrary to the Contract Documents, such materials, no matter in what stage or condition of manufacture, delivery, or erection, may be subsequently rejected.

C. The Contractor shall promptly remove rejected articles or materials from the site of

the Work after notification of rejection. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 BUOYANCY

A. The CONTRACTOR shall be completely responsible for any tanks, pipelines, manholes, foundations or similar improvements that may become buoyant during the construction operations due to groundwater levels. Should there be any possibility of buoyancy, the Contractor shall take the necessary steps to prevent damage due to floating or flooding, and shall repair or replace said improvements at no additional cost.

3.02 DEVIATION FROM SPECIFICATIONS

A. If any part of a submittal deviates from the plans and specifications, it is up to the Contractor to indicate such deviation—in writing—to the Engineer, for determination as to acceptance of the deviation. If no deviation is submitted, it is assumed that the Contractor has fully and completely followed the plans and specifications, and that any discrepancy discovered during construction shall be corrected completely at the expense of the Contractor.

3.03 AMERICANS WITH DISABILITIES ACT (ADA)

A. The Contractor shall make every effort to ensure all concrete work including, but not limited to accessible sidewalks, routes, ramps and curb ramps is compliant with the ADA and Florida Building Code Accessibility.

B. Prior to and during concrete placement, the contractor shall verify the formwork for compliance. Any and all concrete work which is not compliant shall be removed and replaced at no cost to the Owner.

END OF SECTION

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SECTION 01420

DRAWINGS AND SUBMITTALS

PART 1 - GENERAL

1.01 SCOPE

A. In accordance with the General Conditions, CONTRACTOR shall submit a detailed list of data on items for which shop drawings, construction drawings, and samples are to be submitted. Included in this list shall be the names of all proposed Suppliers furnishing specified items. Review of this list by ENGINEER shall not relieve CONTRACTOR from submitting complete drawings and data and providing materials, equipment, etc., fully in accordance with the Contract Documents.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.01 CONTRACTOR RESPONSIBILITY

A.. All submittals shall be in accordance with the General Conditions and accompanied by a transmittal letter prepared in duplicate containing at least the following information:

1. Date.
2. Project Title and Number.
3. CONTRACTOR'S name and address.
4. The number and revision of each drawing submitted.
5. Notification of Deviations from Contract Documents.
6. Submittal Log Number.
7. Specification title and number.

B. Be responsible for and bear costs of damages which may result from the ordering of material or from proceeding with any part of work prior to the completion of the review by ENGINEER of the necessary submittals unless otherwise authorized by ENGINEER in writing.

C. Notify of the need for making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment CONTRACTOR proposes to supply, both as it concerns his own work, or any work affected under other parts, headings, or divisions of drawings and specifications.

3.02 ENGINEER'S REVIEW

A. Submittals will be reviewed in accordance with the General Conditions.

B. Resubmittals will be handled in the same manner as first submittals. On resubmittals CONTRACTOR shall direct specific attention, in writing or on resubmitted drawings, to revisions other than the corrections requested by ENGINEER on previous submissions. CONTRACTOR shall make any additional corrections or clarifications required by ENGINEER.

C. If CONTRACTOR considers any correction indicated on the drawings to constitute a change to the Contract Documents, CONTRACTOR shall give written notice thereof to ENGINEER.

D. No partial submittals will be reviewed. Submittals not complete will be returned to CONTRACTOR for resubmittal.

E. All drawings, schematics, manufacturer's product data, certifications and other drawing submittals required for a system specification shall be submitted at one time as a package to facilitate interface checking.

3.03 SHOP DRAWINGS AND DATA

See Section 01340.

3.04 CONSTRUCTION DRAWINGS

A. When used in the Contract Documents, the term "construction drawings" shall be considered to include CONTRACTOR's plan for temporary structures such as temporary construction fencing, support of open cut excavation, support of utilities, ground water control systems, forming and false-work; for underpinning; and for such other work as may be required for construction but which does not become an integral part of the project.

B. Copies of construction drawings shall be submitted to ENGINEER at least 30 calendar days (unless otherwise specified by ENGINEER) in advance of their being required for work.

C. Construction drawings shall be signed by a registered Professional Engineer or Architect, currently licensed to practice in the State of Florida, and shall convey or be accompanied by, calculations or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, construction drawings must have been reviewed without specific exceptions by ENGINEER, which review will be for general conformance and will not relieve CONTRACTOR in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks to new or existing work are assumed solely by CONTRACTOR. ENGINEER review of the construction drawing assumes no responsibility for construction drawing design or implementation by ENGINEER or CITY.

END OF SECTION

SECTION 01500

CONSTRUCTION CONSIDERATIONS

PART 1 - GENERAL

1.01 HYDRAULIC UPLIFT

A. The Contractor shall be completely responsible for any structures, stormwater conflicting structure, tanks, wetwells, valve vaults, pipelines, manholes, foundations, cellars, or any other similar structures that may become buoyant during the construction operations due to the ground water, floods or buoyancy of piping. Should there be any possibility of buoyancy of a pipeline or structure, the Contractor shall take the necessary steps to prevent its buoyancy. Damage to any existing features within the corridor, or structures and piping due to floating or flooding shall be repaired or the structures replaced at the Contractor's expense.

1.02 WATER TIGHTNESS OF STRUCTURES

A. General: It is the intent of these specifications that all concrete work, sealing work around built-in items and penetrations be performed as required to ensure that groundwater, rainwater, wastewater, chemical solutions or other process liquids in tanks, wetwells, channels, and containers will not leak into any buildings and/or equipment rooms, pipe galleries, habitable areas, or other generally dry areas.

1. The required watertightness shall be achieved by quality concrete construction and proper sealing of all joints and penetrations.

2. Each unit shall be tested separately, and the leakage tests shall be made prior to backfilling and before equipment is installed unless otherwise approved by the Engineer. Only potable water shall be used for the tests.

3. The watertightness of buildings exclusive of the portions designed to contain liquids will consist of checking for leaks due to rain or groundwater infiltration.

4. The Contractor shall provide at his own expense all labor, material, temporary bulkheads, pumps, water, measuring devices, etc., necessary to perform the required test.

B. Built-in Items and Penetrations: All pipe sleeves, built-in items and penetrations shall be sealed as detailed and as required to ensure a continuous watertight seal.

1.03 PAVEMENT RESTORATION AND GEOGRID REPLACEMENT

A. The Contractor shall perform all cutting and patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by such other work. The Contractor shall not endanger any work of others by cutting, excavating

or otherwise altering their work and shall only alter work with the written consent of the Engineer and of the other contractors whose work will be affected.

1.04 ABANDONMENT AND SALVAGE OF EXISTING FACILITIES

A. General: The scope of work requires the Contractor to interface with existing structures, and piping which will be rehabilitated, abandoned or otherwise removed and/or replaced as part of the work. Prior to beginning any work associated with existing facilities to be abandoned, salvaged, or otherwise removed or relocated, the Contractor shall inform the City and the Engineer of his intent so that all arrangements can be made with the City for isolating pipelines (where possible) or otherwise removing existing facilities from service to the extent possible. The Contractor shall not proceed without written authorization from the City. **The Contractor shall contact and coordinate accordingly with utilities companies prior to and during the execution of the relocation, removal or abandonment of existing utilities or structures. Existing utilities coordination is exclusively the responsibility of the Contractor and at their cost.**

B. Pipelines: The Contractor shall properly abandon, salvage or otherwise remove existing pipelines or segments of existing pipelines shown to be abandoned in place, salvaged, or removed as part of the contract work. Unless otherwise indicated in the Contract Documents, all piping shown on the Drawings to be abandoned shall be abandoned in place. Pipe shown to be abandoned need only be removed a minimum three feet clear of new utilities to be installed. Abandon-in-place shall be defined as installing plugs, or other permanent closure, as reviewed and accepted by the City, on all termination's, open ends or ends of pipe designated as being cut, capped and anchored in an acceptable manner. The pipe will remain buried unless otherwise noted. All piping 6-inches in diameter and larger shall be grout filled when abandoned in place, unless otherwise shown on the Drawings. See Sections 02080 and 03600 for additional requirements.

C. Piping indicated on the Drawings as being removed, or any piping to be abandoned which interferes with new structures or piping, shall be excavated and removed using methods which will not disturb adjacent piping or other facilities. All pipe materials shall be subject to salvage by the City as defined herein. Any remaining piping on both ends of pipe segments removed shall be abandoned in-place, per the above definition. After piping has been removed, the Contractor shall backfill the evacuated area in accordance with requirements set forth in other sections of these specifications.

D. Equipment: The Contractor shall abandon, salvage or otherwise remove existing equipment or other facilities as shown on the Contract Drawings or indicated herein. In all cases, the Contractor shall exercise caution when handling the existing equipment so as not to disturb or damage adjacent facilities. The Contractor shall make all repairs to adjacent facilities which may be damaged as a result of the Contractor's efforts in abandoning, salvaging or otherwise removing existing facilities, at no additional cost to the City.

E. Salvage: The City may desire to salvage certain items of existing equipment which are to be dismantled and removed during the course of construction. Prior to removal of any existing equipment or piping from the site of work, the Contractor shall ascertain from

the City whether or not the particular item or items are to be salvaged. Items to be salvaged shall be either stockpiled on the site, in a location as designated by the City, or delivered by the Contractor to the City's designated facility. All other items of equipment shall be disposed of off-site by the Contractor at his own expense, in accordance with applicable laws, ordinances and regulations.

1.05 DIMENSIONS OF EXISTING STRUCTURES

A. Where the dimensions and locations of existing structures are of critical importance in the installation or connection of new work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any materials or equipment which is dependent on the correctness of such information.

1.06 REHABILITATION

A. Certain areas of existing structures, piping, conduits, and the like will be affected by work necessary to complete modifications under this Contract. The Contractor shall be responsible to rehabilitate those areas affected by its construction activities. In addition, the more significant rehabilitations of existing pump stations D-10 and D-11 will require coordination with the City and bypass flow operations to be approved by the City and Engineer and implemented by the Contractor.

B. Disposal of Debris: All debris, materials, piping, and miscellaneous waste products from the work described in this section shall be removed from the project as soon as possible. They shall be disposed of in accordance with applicable federal, state, and local regulations. The Contractor is responsible for determining these regulations and shall bear all costs or retain any profit associated with disposal of these items.

1.07 OBSTRUCTIONS

A. All water pipes, storm piping or drains, sanitary sewers, force mains, gas or other pipe, telephone or power cables or conduits and all other obstructions, whether or not shown, shall be temporarily supported across utility line excavations. The Contractor shall be responsible for any damage to any such pipes, conduits, or structures. Approximate locations of known water, sanitary, drainage, power and telephone installations along route of new pipelines or in the vicinity of new work are shown, but must be verified in the field by the Contractor. The Contractor shall uncover these pipes, ducts, cables, etc., carefully, by hand, prior to installing new lines. Any discrepancies or differences found shall be brought to the attention of the Engineer in order that necessary changes may be made to permit installation of new work. These conditions are supplemental to general requirements elsewhere in the Contract Documents.

1.08 SITE CONDITIONS

A. The Contractor acknowledges that he has investigated prior to bidding and satisfied himself as to the conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, canal stages, tides, water tables or similar physical conditions at the site, the conformation and conditions of

the ground, the character of equipment and facilities needed preliminary to and during prosecution of the Work. The Contractor further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, or any contiguous site, as well as from information presented by the Drawings and Specifications made a part of this Contract, or any other information made available to him prior to receipt of Bids. Any failure by the Contractor to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the Work. The City assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the City.

1.09 CONSTRUCTION DEWATERING AND NOISE

A. All dewatering equipment such as pumps, air compressors, generators, etc. proposed for use during construction in residential areas shall be provided with noise enclosures suitable to meet the requirements of the City of Fort Lauderdale Noise Ordinance and/or Broward County Noise Ordinance, whichever is more stringent.

B. Dewatering shall be done in accordance with Section 02140 - Dewatering.

1.10 SUBSURFACE INVESTIGATIONS

A. The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the nature and location of the work, the conformation of the ground, the character and quality of the substrata, the types and quantity of materials to be encountered, the nature of the groundwater condition, the character of equipment and facilities required preliminary to and during the performance of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract. The prices established for the work to be done shall reflect all costs pertaining to the work. Any claims for extras based on the substrata or ground water table conditions will be disallowed.

B. The Contractor further acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions actually encountered by him in performing the work covered by the Contract, even though such actual conditions may result in the Contractor performing more or less work than he originally anticipated.

C. All existing utilities shall be protected and supported as necessary for all construction limits.

1.11 DIFFERING SITE CONDITIONS

A. The Contractor shall promptly and before such conditions are disturbed, notify the City in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for this contract. The City will promptly investigate the conditions, and if he finds that such conditions do materially so differ and

cause an increase or decrease in the Contractor cost of, or the time required for, performance of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly. Lack of notification in advance of construction efforts will be at the risk of the Contractor and any and all relative delay claims subsequently denied.

1.12 PROTECTION OF PROPERTY

A. The Contractor shall protect all property that may be affected by his work or operations in accordance with Section 01530 - Protection of Existing Facilities. The location and extent of underground and covered facilities are not guaranteed.

B. The Contractor is cautioned to proceed with care in order to prevent the undermining or damage to existing utilities including piping, power cable, utility poles, conduit, duct banks, fiber optic cable, gas, telephone and cable TV services, structures, piping, and any other facilities within the work limits.

C. The Contractor shall take all measures necessary to protect new and existing mechanical equipment from dust and debris. All protective measures shall be furnished, installed, lighted, ventilated, maintained, and removed at the Contractor's own cost.

D. When City water is being used, the supply source shall be protected against contamination in accordance with existing codes and regulations.

E. In the event any of the Contractor's activities were to disrupt or endanger any facilities, he shall at his own expense make all necessary repairs or replacements necessary to correct the situation to the satisfaction of the Engineer. Such work shall progress continuously to completion on a 24-hour per day, seven workday basis. The Contractor shall be responsible for the services of repair crews on call 24 hours per day for emergencies that arise involving work under this Contract.

1.13 WEATHER CONDITIONS

A. Work that may be affected by inclement weather shall be suspended until proper conditions prevail. In the event of impending storms the Contractor shall take necessary precautions to protect all work, materials and equipment from exposure. The City reserves the right, through the opinion of the Engineer, to order that additional protection measures over and beyond those proposed by the Contractor, be taken to safeguard all components of the project. The Contractor shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the City for damage to the work from the elements of weather.

1.14 FIRE PROTECTION

A. The Contractor shall take all necessary precautions to prevent fires at or adjacent to the work, including his own buildings and trailers. Adequate fire extinguisher and hose line stations shall be provided throughout the work area.

1.15 SAFETY AND HEALTH REQUIREMENTS

A. The Contractor shall comply in every respect with all Federal, State and local safety and health regulations. Copies of the Federal Regulations may be obtained from the U.S. City of Labor, Occupational Safety and Health Administration.

B. The Contractor shall provide all barricades, signage, flashing warning lights or other traffic and warning devices necessary to warn pedestrians and area traffic. See Section 01570 for Maintenance of Traffic (MOT) requirements. In addition, all jurisdictional agency requirements must be followed for MOT within the associated ROW limits.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01505

CONTROL OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish personnel and equipment which will be efficient, appropriate and a quantity large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated. If at any time such personnel appear to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character or increase the personnel and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01015 – General Requirements

C. Section 01010 – Special Project Procedures

D. Other Sections as applicable.

1.03 LOCATIONS

A. Pipelines, manholes, vaults, control panels and all appurtenances shall be located as indicated on the Drawings, but the Engineer and Owner reserve the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 OBSTRUCTIONS

A. The attention of the Contractor is drawn to the fact that during digging at the Project site, the possibility exists of the Contractor encountering various water, sewer, gas, telephone, electrical, or other lines not shown on the Drawings. The Contractor shall exercise extreme care before and during digging to locate and flag these lines so as to avoid damage to the existing lines. Should damage occur to an existing line, The Contractor shall repair the line at no cost to the Owner.

B. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

C. The Contractor shall verify the exact locations and depths of all utilities shown and the Contractor shall make exploratory excavations of all utilities that may interfere with the work. All such exploratory excavations shall be performed as soon as practicable after award of the contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's work. When such

exploratory excavations show the utility location as shown to be in error, the Contractor shall so notify the Engineer.

D. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility. Test pits shall be dug at the Contractor's expense, as directed.

E. The Contractor shall protect all Underground Utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

F. In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

G. Where the proper completion of the work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is indicated, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

H. Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor at the Contractor's expense. Sewer laterals are included.

I. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.

J. All power, telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and any other cables encountered along the line of the work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.05 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights, and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such a limiting the length of open trench or prohibiting stacking excavated material in the street, and requiring that the trenches shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.06 TEST PITS

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at his cost at the direction of the Engineer. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineers.

1.07 UTILITY CROSSINGS

A. It is intended that wherever existing utilities such as service lines must be crossed, deflection of the pipe within specified limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the Engineer or the Owner this procedure is not feasible he may direct the use of fittings.

1.08 SANITATION

A. Toilet Facilities - Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes - The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of at the end of each work day away from the site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.

1.09 RELOCATIONS

A. The Contractor shall be responsible for the relocation of structures, including but not limited to light poles, signs, sign poles, fences, piping, conduits, and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations shall be included in the bid for the project and shall not result in any additional cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.

B. Further, the Contractor shall take all necessary precaution to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

3.03 PRIVATE LAND

A. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the land owner. A copy of the written permission agreement shall provided the Engineer and City within twenty-four hours of execution.

3.04 RESTORATION

A. Temporary restoration shall be completed within five days of pipe installation. Temporary restoration shall include all driveways, sidewalks, and roadways and be swept clean and be maintained free of dirt and dust. All areas disturbed by the construction activities shall be restored to proper grade, cleaned up, including the removal of debris, trash, and deleterious materials. All construction materials, supplies, or equipment, including piles of debris shall be removed from the area. All temporarily restored areas shall be maintained by the Contractor. These areas shall be kept clean and neat, free of dust and dirt, until final restoration operations are completed. The Contractor is responsible to utilize dust abatement operations in the temporarily restored areas as required, to the satisfaction of the Engineer.

B. Wherever sidewalks or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of times is so fixed, the Contractor shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

C. Final restoration shall be completed within thirty days of substantial completion. Final restoration shall include the completion of all required pavement replacement of roadways, driveways, curbs, gutters, sidewalks and other existing improvements disturbed by the construction; final grading, placement of sod, pavement marking,

etc., all complete and finished, acceptable to the Engineer.

D. In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with the adjacent undisturbed pavement.

E. The Contractor shall test an installed section of pipeline within five calendar days from completion of the pipeline. A section of pipe is defined as a pipe section which can be isolated by valves for appurtenances is satisfactorily completed, the Contractor shall provide the Engineer with a "Schedule of Existing Facilities Restoration" which will be reviewed and be acceptable to the Engineer. The schedule shall show the existing facilities to be restored and schedule of beginning and completion dates for each item of restoration. The work for completing the final restoration of existing facilities for a tested section of work shall be completed within 30 days of acceptance of the pipeline testing.

END OF SECTION

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SECTION 01510

TEMPORARY UTILITIES

PART 1 – GENERAL

1.01 GENERAL REQUIREMENT

A. The Contractor shall provide for utilities and services for its own operations. The Contractor shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the work.

1.02 JOB CONDITIONS

A. Scheduled Uses: The Contractor shall, in conjunction with establishment of job progress schedule, establish a schedule for implementation and termination of service for each temporary utility or facility; at earliest feasible time, and, when acceptable to City, change over from use of temporary utility service to permanent service.

PART 2 – PRODUCTS

2.01 MATERIALS

A. The Contractor shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided for Contractor by utility company, the Contractor shall provide remainder with matching and compatible materials and equipment and comply with recommendations of utility company.

PART 3 – EXECUTION

3.01 INSTALLATION OF TEMPORARY UTILITY SERVICES

A. General: Wherever feasible, the Contractor shall engage the utility company to install temporary service to project, or as a minimum, to make connection to existing utility service; locate services where they will not interfere with total project construction work, including installation of permanent utility services; and maintain temporary services as installed for required period of use; and relocate, modify or extend as necessary from time to time during that period as required to accommodate total project construction work.

B. Approval of Electrical Connections: All temporary connections for electrical power are the responsibility of the Contractor. Contractor shall be subject to approval of the City and the power company representative, and shall be removed in like manner at the Contractor's expense prior to final acceptance of the work.

C. Separation of Circuits: Unless otherwise permitted by the City, circuits separate from lighting circuits shall be used for all power purposes.

D. Construction Wiring: All wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of OSHA Safety and Health Standards for Construction.

3.02 INSTALLATION OF POWER DISTRIBUTION SYSTEM

A. Power: The Contractor shall provide all necessary power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the work in a safe and satisfactory manner.

B. Temporary Power Distribution: The Contractor shall provide a weatherproof, grounded, temporary power distribution system sufficient to accommodate performance of entire work of project, including, but not necessarily limited to, temporary electrical heating where indicated, operation of test equipment and test operation of building equipment and systems which cannot be delayed until permanent power connections are operable, temporary operation of other temporary facilities, including permanent equipment and systems which must be placed in operation prior to use of permanent power connections (pumps, HVAC equipment, elevators, and similar equipment), and power for temporary operation of existing facilities (if any) at the site during change-over to new permanent power system. Provide circuits of adequate size and proper power characteristics for each use; run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations, and result in least interference with performance of the work; provide rigid steel conduit or equivalent raceways for wiring which must be exposed on grade, floors, decks, or other recognized exposures to damage or abuse.

3.03 INSTALLATION OF LIGHTING

A. Construction Lighting: All work conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper work and to afford adequate facilities for inspection and safe working conditions.

B. Temporary Lighting: The Contractor shall provide a general, weatherproof, grounded temporary lighting system in every area of construction work, and provide sufficient illumination for safe work and traffic conditions; and run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible

damage from construction operations on grade, or other recognized areas of possible damage or abuse.

3.04 WATER SUPPLY

A. The Contractor shall provide all facilities necessary to convey the water from the source to the points of use in accordance with the requirements of the Contract Documents. The Contractor shall pay the fee for water meter and all other charges for water use.

B. The Contractor shall provide and operate all pumping facilities, pipelines, valves, hydrants, storage tanks, and all other equipment necessary for the adequate development and operation of the water supply system. Water used for domestic purposes shall be free of contamination and shall conform to the requirements of the State and local authorities for potable water. The Contractor shall be solely responsible for the adequate functioning of its water supply system and shall be solely liable for any claims arising from the use of same, including discharge or waste of water there from.

C. Water Connections: The Contractor shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the affected water system. For each such connection made, the Contractor shall first attach to the fire hydrant or pipeline a valve and a meter, if required by the said authority, of a size and type acceptable to said authority and agency. The Contractor shall pay all permit and water charges with the exception of City permits being paid for by the City.

3.05 INSTALLATION OF SANITARY FACILITIES

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of Contractor's employees. Toilets at construction job sites shall conform to the requirements of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the City and in accordance with all laws and regulations pertaining thereto.

C. Sewer Connection: The Contractor shall coordinate with the City for obtaining sewer connection and shall pay all sewer usage charges.

3.06 INSTALLATION OF FIRE PROTECTION

A. Fire Protection: The construction plant and all other parts of the work shall be connected

with the Contractor's water supply system and shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, or other sufficient means shall be provided for fighting fires in the temporary structures and other portions of the work, and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire.

3.07 OPERATIONS AND TERMINATIONS

A. Inspections: Prior to placing temporary utility services into use, the Contractor shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.

B. Protection: The Contractor shall maintain distinct markers for underground lines, and protect from damage during excavating operations.

C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the Contractor shall promptly remove installation unless requested by City to retain it for a longer period. The Contractor shall complete and restore work which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.

D. Removal of Water Connections: Before final acceptance of the work on the project, all temporary connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the City and to the agency owning the affected utility.

END OF SECTION

SECTION 01520

MAINTENANCE OF FACILITIES AND SEQUENCE OF CONSTRUCTION

PART 1 - GENERAL

1.01 GENERAL

The Contractor shall ensure the continuous operation of all existing sanitary sewer systems, potable water systems, and stormwater facilities during construction. In addition, the Contractor shall provide temporary traffic routing and coordinate his work so as to minimize impact to the utilities systems located in the area. In performing the work shown and specified, the Contractor shall plan and schedule his work as outlined in this Section.

1.02 CONSTRUCTION SCHEDULE

The Construction Schedule shall be submitted by the Contractor in accordance with the contract Specifications.

1.03 USE OF FACILITIES BEFORE COMPLETION

The City reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract.

1.04 CONNECTION OF EXISTING SYSTEMS

All connections to existing systems shall be performed in such a manner that no damage and no interruptions are caused to the existing system. Partial clearances may be required of the Contractor for City use of a portion of the system. On completion of its installation, the Contractor shall complete the connections to the existing systems in a proper manner. Any damage caused to existing installations shall be repaired or replaced by the responsible Contractor at no additional cost to the City.

1.05 COORDINATION WITH CITY PERSONNEL

A. Before commencing work involving removing or placing in operation existing or new facilities or tie-ins to existing facilities, the Contractor shall notify the City at least three (3) business days in advance in writing. The City shall be responsible for removing facilities from operation as deemed necessary.

B. The Contractor shall, under no circumstances, interfere with the existing potable water, sewer, stormwater and other facilities without the City's or other jurisdictional authorities' authorizations, in writing, and supervision. The Contractor shall notify the City's representative in writing a minimum of three (3) work days prior to each scheduled service request. This notification shall be provided on the City's standard form, or on an approved equivalent form completed in full by the Contractor.

1.06 COORDINATION WITH PRIVATE PROPERTY OWNERS

Prior to commencing any construction, the Contractor shall distribute notifications to all affected parties within the work limits and shall obtain permission from all affected parties prior to commencement of construction. All notifications must be reviewed and approved by the City prior to distribution. Notifications, including flyers, signage, VMS boards and all other forms of notifications are to be provided by the Contractor at their cost and prior to commencement of construction.

1.07 GENERAL SEQUENCE OF CONSTRUCTION AND OPERATION REQUIREMENTS

A. Work under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption to the public's use of roadways, driveways, parking areas, and utilities. Utilities shall include but not be limited to water, sewerage, irrigation, drainage structures, gas, electrical service, cable TV services, fiber optic cables, and telephone. Prior to commencing with the work, Contractor shall perform a location investigation of all existing underground and above ground utilities and facilities in accordance with Section 01530 - Protection of Existing Facilities. Utilities that present potential conflict with the proposed piping shall be field verified with soft digging at the Contractor's expense and prior to commencement of construction. Potential conflicts not identified in advance of construction or via working ahead of construction (200-feet ahead with soft digs and field verifications) to locate upcoming conflicts within the work zone will not be justifiable for change orders or delay claims by the Contractor.

B. The outlined sequence of construction does not include all items necessary to complete the work, but is intended to identify the sequence of critical events necessary to minimize any disruptions and to avoid any impact to continued collection system service. It shall be understood by the Contractor that the critical events identified are not all inclusive and that additional items of work not shown may be required. The sequence of construction is a precedence requirement and does not attempt to schedule the Contractor's work. It is intended only to indicate which activities must precede other activities in order to minimize interferences and disruptions.

C. All work by the Contractor that disrupts the normal utilities operations shall be shown on the Construction Schedule specified in Section 01310 and specifically scheduled with the City. Schedule notification shall consist of a written notice defining the work to be accomplished, the potential duration of the interruption, and the mitigating effort to be performed by the Contractor. The written notice shall be submitted to the City fourteen days in advance of the proposed work and the City will respond to the Contractor in writing within seven days of receipt of the notice regarding the acceptability of the proposed plan.

D. At no time, will the Contractor be allowed to close off any pipelines, or open any valves, or take any other action which would affect the operation of the existing system, except as specifically required by the drawings and specifications, and until authorization is granted by the City or Engineer and after proper notification has been provided.

E. Temporary installations required to complete a particular aspect of the work during the allowed time period shall be determined by the Contractor and implemented by the

Contractor at no additional cost to the City. All such temporary installations shall be subject to review and acceptance.

F. Sequence of certain major events and identification of time constraints for removing existing facilities from active service and installation of new facilities are described below in paragraph 1.08. No phase of work (or tasks within a phase) shall preclude or be performed in parallel with a subsequent phase unless specifically defined so in these documents. In all cases, work in each phase shall be checked out and accepted for satisfactory use, subject to the Engineer's approval, prior to the Contractor proceeding to the next phase of construction.

1.08 DETAILED SEQUENCE OF CONSTRUCTION AND OPERATION REQUIREMENTS

A. Phasing of the work shall be determined by the Contractor prior to commencement of construction. The Contractor is to coordinate with the City prior to developing their construction schedule accordingly and to obtain their approval. A phasing plan must be submitted and approved by the City prior to commencement of construction. In addition, bypass pumping, tankering, and wastewater flow control plans must be submitted by the Contractor and approved prior to commencement of construction. The following tasks are a general summary for the work and are not inclusive of all work to be performed by the Contractor nor are they provided to direct the Contractor with their means and methods for implementation of the job requirements. However, they are suggested to facilitate construction and to meet the City and the project objectives:

B. Phase I - Mobilization / Site Preparation: Mobilize for work – Video working areas, set up staging and storage areas, obtain permits, develop and submit construction schedule, submit shop drawing schedule, survey, locate existing utilities and elevations with soft digging, verify existing fittings to be connected, shop drawing submittals, and procure materials.

C. Phase II – Construction and Rehabilitation of the Pump Stations and Wastewater Systems: The tasks included under this phase consist of construction of proposed improvements and rehabilitation of existing pump stations as described in the approved construction plans.

D. Phase III - Final Sitework and Closeout: Final pavement and asphalt overlay of the affected road sections, final restoration, final grading, sodding, miscellaneous work, demobilization and related closeout activities as described in Section 01700 - Project Closeout.

E. Construction Constraints: Contractor shall comply with the following constraints during construction and utilize constraints in determining a sequence of construction:

1. Construction work during the installation of the proposed work shall be limited to the public right-of-ways. Residents and businesses, etc., shall have access to their driveways at all times.

2. The excavation area shall be surrounded with barricades and obstructions illuminated with temporary lighting furnished, installed and maintained by the Contractor.

3. Final restoration of roads, driveways, sidewalks and all other paved areas shall be completed within a timely fashion.

4. Contractor is expected to work regular hours between the hours of 7:00 AM and 4:00 PM, Monday through Friday or as otherwise directed by the City and/or agency having jurisdiction over the ROW limits. Requests for approval to work during other than regular hours must be submitted to the Engineer at least 72 hours in advance of the period proposed for such overtime work and shall set forth the proposed schedule for overtime work to give Engineer ample time to arrange for his personnel to be at the site of the Work, even for work required to occur by contract. Contractor shall pay for additional charges for inspections of the overtime or after hours, night and weekend work. Such additional charges shall be a subsidiary obligation of Contractor, and no extra payment shall be made by City on account of such overtime or after hours, night or weekend work. The Contractor shall not violate the local jurisdiction's Noise Ordinance.

5. Work hours as required by other jurisdictional authorities or by permit conditions must be followed at all times. The Contractor shall notify the authority if any deviations to the standard work hours are anticipated.

6. The Contractor shall pay liquidated damages of $500/DAY for not complying with any one of the above requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COORDINATION WITH EXISTING UTILITIES AND OTHER AGENCIES

The Contractor shall coordinate with Sunshine One-Call Notification at 811 minimum of 48 business hours prior to any excavation for location of existing underground facilities. Permit requirements for notifications to all jurisdictional agencies within the work limits must be adhered to by the Contractor.

3.02 COOPERATION

The Contractor shall allow the City or its agents, and other project contractors or their agents, to enter facilities being constructed under this Contract for the purpose of constructing, installing, operating, maintaining, removing, repairing, inspecting, reviewing, altering or replacing such equipment pipes, sewers, conduits, manholes, wires, or other structures which may be required to be installed at or in the work area. The Contractor shall cooperate with all the aforesaid parties

and shall allow reasonable provisions for the execution of any other work by the City, or others, to be done in connection with his work, or in connection with normal use of the facilities.

END OF SECTION

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SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

B. The Contractor shall verify the exact locations and depths of all utilities shown and the Contractor shall make exploratory excavations of all utilities that may interfere with the work. All such exploratory excavations shall be performed as soon as practicable after award of Contract and, in any event, a sufficient time and at least 200 feet in advance of the construction work area to avoid possible delays to the Contractor's Work. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall so notify the City and Engineer immediately. No delay claims or change orders will be allowed for the Contractor's lack of working ahead to identify conflict potential upcoming within the work limits.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility and shall be at no additional cost to the City.

1.02 RESTORATION OF ROADWAYS

A. General: All paved areas cut or damaged during construction shall be replaced with approved materials and of equal thickness to match the existing adjacent undisturbed areas and grades. All temporary and permanent pavement shall conform to the requirements of the affected pavement. All pavements which are subject to partial removal shall be neatly saw cut in straight lines. The Contractor will be required, as a minimum, to match existing pavement thicknesses, base material type and thicknesses, and provide any necessary improvements per jurisdictional requirements for all right-of-ways. <u>The Contractor is required to perform pavement corings prior to commencement of construction in order to evaluate the existing pavement and base material as well as to identify groundwater conditions such that pavement restoration includes matching existing pavement thicknesses, base materials and thicknesses and obtaining jurisdictional approvals for all pavement restoration prior to commencement of construction or restoration efforts along project roadways.</u>

B. <u>Temporary Restoration</u>: Temporary restoration includes repair to all driveways, sidewalks and roadways. They shall be swept clean and be maintained free of dirt and dust. All areas disturbed by the construction activities shall be restored to proper grade, cleaned up, including the removal of debris, trash, and deleterious materials. All

construction materials, supplies, or equipment, including piles of debris shall be removed from the area. All temporarily restored areas shall be maintained by the Contractor. These areas shall be kept clean and neat, free of dust and dirt, until final restoration operations are completed. The Contractor is responsible to utilize dust abatement operations in the temporarily restored areas as required, to the satisfaction of the Engineer.

C. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration and improvements.

D. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement at all times.

E. Final Restoration: Final restoration shall include the completion of all required pavement replacement of roadways, driveways, curbs, gutters, sidewalks and other existing improvements disturbed by the construction: final grading, placement of sod, installation or replacement of any trees or shrubs, repair of irrigation systems, pavement markings, etc., all complete and finished, acceptable to the Engineer and the City.

1.03 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The Contractor shall protect all underground utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations.

B. Where the proper completion of the Work requires the temporary or permanent removal and / or relocation of an existing utility or other improvement, the Contractor shall remove and temporarily replace or relocate such utility or improvement in a manner satisfactory to the City and the Owner of the utility/facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal and at the Contractor's cost. All potential utility relocations must be coordinated by the Contractor and approved by the utility facility owner.

C. City's Right of Access: The right is reserved to the City and to the Owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the work of this Contract.

D. Underground Utilities Shown or Indicated: Existing utility lines, and all utility lines that are constructed during excavation operations shall be supported and protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired by the Contractor at their cost.

E. Underground Utilities Not Shown or Indicated: In the event that the Contractor damages any existing utility lines that are not identified in the field or the locations of which are not made known to the Contractor prior to excavation by the City and Sunshine One-Call Notification, a written report thereof shall be made immediately to the City. The Contractor shall make the repairs immediately and at their cost. In addition, the Contractor shall perform soft digs or other due diligence necessary to field verify existing utilities and potential conflicts, while working ahead of the construction at least 200-feet, such that potential conflicts can be identified. No delay claims or change orders will be allowed when the Contractor's has not worked ahead of the current construction work area and performed necessary due diligence to field verify existing utilities and to keep the construction effort moving forward.

F. Approval of Repairs: All repairs to a damaged improvement are subject to inspection and approval by an authorized representative of the City before being concealed by backfill or other Work.

G. Maintaining in Service: All oil and gasoline pipelines, power, and telephone or other communication cable ducts, gas and water mains, irrigation lines, reuse lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables as well as all other active utilities encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the City are made with the owner of said utilities. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.04 TREES WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

Trees are to be protected at all times. If any tree removal, trimming or relocation is required, the Contractor needs to coordinate with the City, accordingly. Trees that are removed are required to be replaced at the Contractor's expense and in kind to the greatest extent possible. All deviations from a like-to-like tree replacement must be approved by the City prior to tree removal and new tree installation. All required permits related to tree removal are the responsibility of the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01550

SITE ACCESS AND STORAGE

PART 1 -GENERAL

1.01 SITE ACCESS

A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the Work. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations.

B. The Contractor will be responsible for monitoring its personnel, equipment and material deliveries.

1.02 STORAGE

A. Any equipment and materials stored shall be in accordance with the manufacturer's recommendations and as indicated by the City.

B. Responsibility for protection and safekeeping of equipment and materials will be solely that of the Contractor, and no claim shall be made against the City by reason of any act of an employee or trespasser. Should an occasion arise necessitating access to an area occupied by stored equipment and/or materials, the Contractor shall immediately move them.

C. If the Contractor requires staging and storage areas, the Contractor shall obtain such areas from offsite sources at no additional cost to the City. Storage and staging facilities are permitted on private property subject to the review and written approval of the City.

1. Notice to proceed will not be issued until the final approval is obtained.

2. Staging area sign requirements are per City or other jurisdictional requirements.

D. Upon completion of the Contract, the Contractor shall remove from the storage and work areas all of their equipment, temporary fencing, surplus materials, rubbish, etc., and restore the area to its original or better conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01568

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion and sedimentation controls as required by applicable rules and regulations and permit conditions.

2. Temporary erosion controls include, but are not limited to, grassing, mulching, netting, and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.

3. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.

4. Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

B. Related Work Described Elsewhere:

1. Earthwork: Section 02200.

2. Sodding: Section 02930.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

A. Sodding is specified in Section 02930.

B. Netting shall be fabricated of material acceptable to the Owner.

2.02 SEDIMENTATION CONTROL

A. Hay bales shall be synthetic hay bales.

B. Netting shall be fabricated of material acceptable to the Owner.

C. Filter stone shall be crushed stone which conforms to Florida Department of Transportation (FDOT) Specifications.

D. Concrete block shall be hollow, non-load bearing type.

E. Concrete shall be exterior grade not less than 1-inch thick.

PART 3 - EXECUTION

3.01 EROSION CONTROL

A. Minimum procedures for grassing are:

1. Scarify slopes to a depth of not less than 6 inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.

2. Sow seed within 24 hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.

3. Apply mulch loosely and to a thickness of between 3/4 inch and 1-1/2 inches.

4. Apply netting over mulched areas on sloped surfaces.

5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

A. Install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Hay bales which deteriorate and filter stone which is dislodged shall be replaced.

3.03 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the State of Florida, the Owner or Engineer, the Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

END OF SECTION

SECTION 01570

TRAFFIC REGULATIONS AND MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 TRAFFIC CONTROL

A. Contractor shall obey all traffic laws and comply with all the requirements, rules and regulations of the State of Florida Department of Transportation (FDOT), the City of Fort Lauderdale, Broward County and other local authorities having jurisdiction, to maintain adequate warning signs, lights, barriers, flagmen, police, etc., for the protection of vehicular traffic and pedestrian traffic on public roadways and within the project corridor.

B. The Contractor shall maintain one (1) lane of traffic open at all times during construction. Both lanes of traffic must be maintained and open during non-working hours. Access to residents and businesses must be maintained at all times with approved MOT devices; including but not limited to, all necessary signage, plates, ramps and other measures to adequately inform and convey traffic and pedestrians safely through the work limits.

C. The Contractor shall maintain traffic and protect the public from all damage to persons and property within the Contract Limits, in accordance with the Contract Documents and all applicable state, city and local regulations. The Contractor shall conduct its construction operations so as to maintain and protect access, for vehicular and pedestrian traffic, to and from all properties and business establishments adjoining or adjacent to those streets affected by his operations, and to subject the public to a minimum of delay and inconvenience. Suitable signs, barricades, barrier walls, police, etc. shall be erected and in place and the work outlined by adequate lighting at night. Danger lights shall be provided as required. Watchmen, flagmen, and crossing guards shall be provided as may be necessary for the protection of traffic.

D. For the protection of vehicular and pedestrian traffic in public or private streets and alleyways, the Contractor shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of the "Manual of Uniform Traffic Control Devices (MUTCD), published by U.S. City of Transportation, Federal Highway Administration (ANSI D6.1).

E. The Contractor shall submit a Maintenance of Traffic (MOT) Plan for approval at least 30 days prior to construction work. The plan shall be signed and sealed by a registered PE in the state of Florida and be approved by all jurisdictional agencies having authority over the right-of-way limits.

F. Prior to performing any work within or abutting the State rights-of-way, the Contractor shall submit a detailed Maintenance of Traffic (MOT) Plan to Florida Department of Transportation (FDOT) for approval as required by the FDOT Utility Permit. The plan shall be signed and sealed by a registered PE in the state of Florida. All MOT plans and permitting efforts are at the Contractor's cost.

G. All signs, signals, and barricades shall conform to the requirements of FDOT.

H. All dirt spilled from the Contractor's trucks on existing pavements shall be removed by the Contractor immediately and whenever in the opinion of the City the accumulation is sufficient to cause the formation of mud, dust, interference with traffic or create a traffic hazard.

I. Areas designated by the Broward County Traffic Engineering Division as "Safe Walk Routes" shall adhere to the requirements of the Broward County Maintenance of Traffic School/Pedestrian.

1.02 TEMPORARY CROSSINGS

A. General: Wherever necessary or required for the convenience of the public or individual residents at street or highway crossings, private driveways, or elsewhere, the Contractor shall provide suitable temporary bridges or stabilized paths over unfilled excavations for which written consent shall be delivered to the City prior to excavation. All such bridges shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or stabilized paths for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such, or shall submit designs to said authority for approval, as may be required.

B. Street Use: Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the City and/or proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown and as approved by jurisdictional authorities. Toe boards shall be provided to retain excavated material if required by the City or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, sewer inlets, and other drainage facilities.

C. The Contractor shall take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. The Contractor shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions. All signs, signals, and barricades shall conform to the requirements of FDOT.

D. The Contractor shall remove traffic control devices when no longer needed, repair all damage caused by installation of the devices, and shall remove post settings and backfill the resulting holes to match grade.

E. Temporary Street Closure: If closure of any street is required during construction, a formal application for a street closure shall be made to the authority having jurisdiction at least 30 days prior to the required street closure in order to determine necessary sign and detour requirements. Detour signs shall be provided, installed prior to street closure, and removed after construction by the Contractor. MOT plans shall address all temporary street closures.

F. Temporary Driveway Closure: The Contractor shall notify the City or occupant (if not owner-occupied) of closure of driveways to be closed more than one eight-hour work day, at least three (3) working days prior to the closure. The Contractor shall minimize the inconvenience and minimize the time period that the driveways will be closed. The Contractor shall fully explain to the owner/occupant how long the work will take and when closure is to start.

G. Temporary Bridges: Whenever necessary, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the Contractor shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges or steel plates, which written consent shall be delivered to the Engineer prior to excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required. Steel plates must have approval prior to being placed over all open excavations. The Contractor assumes all risks for any shifting of the plates, if approved for use.

1.03 CONTRACTOR PARKING

A. The Contractor shall obtain parking for all personnel vehicles as required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01590

CONSTRUCTION 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.

See Page 2, "Construction Sign Request Form", for information on the sign for this Project.

Construction Sign Request Form P12177

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

01590-2

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Engineer.

3. Manufactured and fabricated products:

a. Design, fabricate and assemble in accord with the best engineering and shop practices.

b. Manufacture like parts of duplicate units to standard sizes and gauges to be interchangeable.

c. Two or more items of the same kind shall be identical, by the same manufacturer.

d. Products shall be suitable for service and conditions.

e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract.

2. Summary of Work: Section 01010.

3. Special Project Procedures: Section 01100.

4. Shop Drawings: Section 01340.

5. Cleaning: Section 01710.

1.02 APPROVAL OF MATERIALS

A. Only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the Work without prior approval of the Engineer.

B. Within thirty (30) days after the Effective Date of the Agreement, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the Work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product to form an opinion as to conformity to the specifications. The data shall comply with Paragraph 1.06 of this Section.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the Work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed and shipped as directed at the Contractor's expense. Except as otherwise noted, the Contractor will make arrangements for and pay for the tests.

D. The Contractor shall submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the work. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the Work shall correspond to the approved samples or other data.

1.03 SUBSTITUTIONS AND PRODUCTS OPTIONS

A. Only approved products listed in the Appendix, *Approved Manufacturer's List*, will be used on the project, or as otherwise approved by the City and Engineer.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. When Contract Documents require the installation of Work to comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including five copies to the Engineer.

1. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformance with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instruction, consult with Engineer for further instructions.

2. Do not proceed with Work without clear instructions.

C. Perform Work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.06 STORAGE AND PROTECTION

A. The Contractor shall furnish a covered, weather-protected storage structure providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this Project. Storage of equipment shall be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including connection heaters, placing of storage lubricants in equipment, etc. Corroded, damaged or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.

B. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weather-tight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

3. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings and provide adequate ventilation to avoid condensation.

4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

D. Cement, sand and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural and miscellaneous steel, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete beams shall be handled and stored in a manner to prevent cracking. Brick, block and similar masonry products

shall be handled and stored in a manner to reduce breakage, chipping, cracking and spilling to a minimum.

E. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

F. 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 deterioration.

G. Protection After Installation: Provide substantial coverings and necessary to protect installed products from damage from traffic and subsequent construction operations. Remove coverings when no longer needed.

H. The Contractor shall be responsible for all material, equipment and supplies sold and delivered to the Owner under this Contract until final inspection of the work and acceptance thereof by the Owner. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.

I. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering and any other costs associated with making the necessary corrections.

1.07 SPECIAL TOOLS

A. Manufacturers of equipment and machinery shall furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The Contractor shall preserve and deliver to the Owner these tools and instruction in good order no later than upon completion of the Contract.

1.08 STORAGE AND HANDLING OF EQUIPMENT ON SITE

A. Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed:

1. Equipment shall not be shipped until approved by the Engineer. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Engineer, until such time as the equipment is to be installed.

2. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.

4. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed with the Owner by him. These instructions shall be carefully followed and a written record of this kept by the Contractor.

5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, such that it does not deteriorate from lack of use.

6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the Owner.

7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certification by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.09 WARRANTY

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740. The manufacturer's warranty period shall be concurrent with the Contractor's for one (I) year after the time of completion and acceptance.

1.10 SPARE PARTS

A. Spare parts for certain equipment provided have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Owner. In addition, the Contractor shall furnish to the Engineer an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.

1.11 GREASE, OIL AND FUEL

A. All grease, oil and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial breaking of the equipment, which in no event shall be any longer than three weeks of operation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish and install products specified and named in their respective Specifications or on the Drawings unless substitution is allowed.

B. For products specified only by reference standard, select product meeting that standard, by any manufacturer.

C. For products specified by naming several products or manufacturers, select any one of those products and manufacturers names which complies with their respective Specifications.

D. For products specified by naming only one or more products or manufacturers and stating "or equal", submit a request as for substitutions, for any product or manufacturer which is not specifically named.

E. Requests for any substitutions not submitted in accordance with the instructions herein will be denied.

1.02 RELATED SECTIONS

A. Section 01340 – Shop Drawings

B. Other Sections as Applicable.

1.03 PRODUCTS LIST

A. Submit to Engineer five copies of complete list of major Products which are proposed for installation.

B. Product selection is governed by the Contract Documents and governing regulations, not by previous project experience.

1. Where a single or multiple products or manufacturers are named, provide one of the products indicated or submit a request for substitution for any product or manufacturer not named unless no substitutions are permitted.

2. Where the Specifications only require compliance with performance requirements, an imposed code, standard or regulation, select a product that complies with the requirements, standards, codes or regulations specified.

3. Manufacturers named in a Specification section are those manufacturers considered capable of manufacturing products conforming to the specified requirements. The naming of a particular manufacturer does not imply acceptance or approval of just any standard product of that manufacturer.

C. Tabulate Products by specification section number and title.

D. For products specified only by reference standards, list for each such Product:

1. Name and address of manufacturer.

2. Trade Name.

3. Model or catalog designation.

4. Manufacturer's data:

   a. Reference standards.

   b. Performance test data.

1.04 SUBSTITUTION SUBMITTAL REQUIREMENTS

A. For convenience in designation in the Contract Documents, materials to be incorporated in the Work may be designated under a trade name or the name of a manufacturer and its catalog information. The use of alternative material which is equal in quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:

   1. The burden of proof as to the quality and suitability of such alternative equipment, products, or other materials shall be upon the Contractor.

   2. The Engineer will be the sole judge as to the comparative quality and suitability of such alternative equipment, products, or other materials and its decisions shall be final.

   3. Base Bid requirements outlined in the Bid Form.

B. The Contractor may offer any material, process, or equipment which it considers equivalent to that indicated. Unless otherwise authorized in writing by the ENGINEER, the substantiation of offers of equivalency must be submitted prior to 10 days before the bid opening date. The Contractor, at its sole expense, shall furnish data concerning items it has offered as equivalent to those specified. The Contractor shall have the material as required by the Engineer to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the items will fulfill its intended function. Installation and use of a substitute item shall not be made until accepted by the Engineer. If a substitute offered by the Contractor is found to be not equal to the specified material, the Contractor shall furnish and install the specified material.

C. The Contractor's attention is further directed to the requirement that failure to submit data substantiating a request for the substitution of an "or equal" item within said period shall be deemed to mean that the Contractor intends to furnish one of the specific brand-named products named in the specification, and the Contractor does hereby waive all rights to offer or use substitute products in each such case. Wherever a proposed substitute product has not been submitted within said period, or wherever the submission of a proposed substitute product fails to meet the requirements of the specifications and an acceptable resubmittal is not received by the Engineer within said period, the Contractor shall furnish only one of the products originally-named in the Contract Documents.

D. After award of the Contract, Engineer will consider formal requests from the Contractor for substitution of specified products.

E. After the end of that period, the request will be considered only in case of product unavailability or other conditions beyond the control of the Contractor.

F. Submit a separate request for each substitution. Support each request with:

1. Complete data substantiating compliance of the proposed substitution with requirements stated in the Contract Documents:
    a. Product identification, including manufacturer's name and address.
    b. Manufacturer's literature; identify:
        1) Product description.
        2) Reference standards.
        3) Performance and test data.
    c. Samples, as applicable.
    d. Name and address of similar projects on which product has been used, and the date of each installation.
2. Itemized comparison of the proposed substitution with product specified; List significant variations.
3. Comparison of the qualities of the proposed substitution with that specified.
4. Changes required in other elements of the work because of the substitution.
5. Availability of maintenance service, and source of replacement materials.
6. Data relating to changes in the construction schedule.
7. Any effect of the substitution on separate contracts.
8. List of changes required in other work or products.
9. Accurate cost data comparing proposed substitution with product specified.
10. Designation of required license fees or royalties.
11. Designation of availability of maintenance services, and sources of replacement materials.
12. Cost data is complete and includes related costs under his Contract, but not:
    a. Cost data comparing the proposed substitution with the product specified
    b. Any required license fees or royalties
    c. Engineer's costs of redesign or revision of Contract Documents.
13. Substitute products shall not be ordered or installed without written acceptance of Engineer.

G. Do not imply or indicate substitutions on shop drawings or product data submittals without a separate formal request.

H. Only one request for substitution for each product will be considered. If not accepted, Contractor shall provide specified product.

1.05 SUBSTITUTIONS WILL NOT BE CONSIDERED FOR ACCEPTANCE WHEN:

A. They are indicated or implied on Shop Drawings or product data submittals without a formal request from Contractor.

B. The manufacture of the product substitution does not meet the Qualifications as stated in the specifications as determined by the Engineer.

C. They are requested directly by a subcontractor or supplier.

D. No data is provided relating to changes in construction schedule.

E. There is any effect of substitution on separate contracts.

F. Changes are required in other Work or products.

G. There is no accurate cost data comparing proposed substitution with product specified.

H. There are required license fees or royalties above and beyond the specified vendor.

I. Availability of maintenance services, sources of replacement materials does not equal that provided by the specified vendor.

J. Acceptance will require substantial revision of Contract Documents.

1.06 CONTRACTOR'S REPRESENTATION

A. A request for a substitution constitutes a representation that the Contractor:

1. Has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.

2. Will provide the same warranties or bonds for substitution as for product specified.

3. Will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.

4. Waives claims for additional costs caused by substitution which may subsequently become apparent.

5. ENGINEER DUTIES

B. Review Contractor's requests for substitutions in accordance the Shop Drawing review requirements.

C. Notify Contractor, in writing, of decision to accept or reject requested substitution.

D. The Engineer shall be the judge of the acceptability of the proposed substitution.

1.07 SUBSTITUTION SUBMITTAL REQUIREMENTS – “NO SUBSTITUTIONS PERMITTED”

A. Contractor may <u>not</u> request a substitute item or vendor/manufacturer for which the specifications indicate “No Substitutions Permitted“.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01650

START-UP/CHECK OUT

I. SCOPE OF WORK

A. The work specified herein consists of start-up and final check out of Mechanical, Electrical, Communications, Pneumatic, Hydraulic, Conveyance or Special Construction or any other discipline as called for by the technical specifications of the Contract Documents. These systems (heating, ventilating, air conditioning, plumbing, fire protection systems, HVAC and control systems, communications and alarm systems, lighting, power distribution, controls, and other electrical systems and elevators) and other operating equipment as required; will be demonstrated, to Engineer, to operate in the manner prescribed by the Contract Documents to ensure a complete operating systems, ready for City's use.

II. IMPLEMENTATION

A. Preliminary Requirements

1. Start-up Certification: Prior to start-up of a system, successfully complete all the testing required of the individual components of the system. Submit five copies of DEMONSTRATION CERTIFICATION (attached to this section) signed by Contractor, subcontractor and the manufacturer's representative. All copies shall be provided with the respective copies of the Operation and Maintenance Manual. This form shall be completed and submitted before Instruction in Operation to Engineer or a request for final inspection.

2. Demonstrate to Engineer and Design Engineer that all of the components of the system are operating under their own controls as designated.

3. Coordinate start-up activities with City's operating personnel, the Manufacturers Representative and with Engineer prior to commencing start-up of a system.

B. START-UP

1. Confirm that all equipment in a system is properly energized, prior to start-up.

2. Initiate start-up of each system in accordance with the Operation and Maintenance Manual.

3. Observe the system operation and make adjustments as necessary to optimize the system performance.

4. Coordinate with to Engineer and Design Engineer for any adjustments desired or operational problems requiring debugging.

5. Make adjustments as necessary.

6. Acceptability of each system's performance will be based on the system performing as specified, under actual operating conditions. The intent of the start-up is to demonstrate to Engineer that each system will function as a complete and operable system under normal as well as emergency operating conditions and is ready for acceptance.

7. Demonstrate the essential features of the systems as delineated elsewhere in the Contract Documents. Each system shall be successfully demonstrated only once, after completion of all required testing. The disciplines involved may include, but are not limited to:

   a. Mechanical

   b. Conveyance

   c. Electrical

   d. Communication

   e. Instrumentation & Controls

   f. Pneumatic

   g. Hydraulic

   h. Specialized Construction

C. Certificate of Completed Start-Up Demonstration:

1. Submit five copies of Certificate of Completed Start-Up Demonstration memo signed by Contractor, Subcontractor and Engineer and insert one copy in each Operation and Maintenance Manual.

MANUFACTURER'S CHECK CERTIFICATION

___ CITY: No. Copies ____
___ ENGINEER No. Copies ____
___ DESIGN ENGINEER: No. Copies ____
___ CONTRACTOR No. Copies ____
___ FIELD: No. Copies ____
___ OTHER: No. Copies ____

PROJECT DATA AND CONTRACT DATA

NAME OF PROJECT:_____ PROJECT NUMBER_____

LOCATION:_____DATE:_____

CITY:_____ DRAWING NO.:_____

OTHER:_____
_____

SYSTEM DESCRIPTION:_____

Name of equipment checked:_____

Name of manufacturer or equipment:_____

1. The equipment furnished by us has been checked on the job by us. We have reviewed (where applicable) the performance verification information submitted to us by Contractor.

2. The equipment is properly installed, except for items noted below.*

3. The equipment is operating satisfactorily, except for items noted below.*

4. The written operating and maintenance information (where applicable) has been presented to Contractor, and has been reviewed with him in detail. Five (5) copies of all applicable operating and maintenance information and parts lists have been furnished to Contractor for insertion in each of the Equipment Brochures.

MANUFACTURER'S CHECK CERTIFICATION SIGNATURE PAGE

MANUFACTURER* **CONTRACTOR**

Checked By: _____ _____

Name of Mfgr's Rep. Name of Contractor

_____ _____

_____ _____

_____ _____

Address & Phone # of Rep. Address & Phone # of Contractor

_____ _____

Authorized Sign/Title/Date Authorized Sign/Title/Date

SUBCONTRACTOR **DATE OF CERTIFICATION CHECK**

_____ _____

Name of Subcontractor Making Check Date

_____

_____

_____

Address & Phone # of Subcontractor

_____

Authorized Sign/Title/Date

***Manufacturer's Representative Notations: Exceptions noted at time of check were:**

_____

_____

_____

_____

Manufacturer's Representative to note adequacy of related equipment that directly affects operation, performance or function of equipment checked. (No comment presented herein will indicate adequacy of related systems or equipment):

DEMONSTRATION / START-UP CERTIFICATION

___ CITY:	No. Copies ____
___ ENGINEER:	No. Copies ____
___ DESIGN ENGINEER:	No. Copies _____
___ CONTRACTOR:	No. Copies ____
___ FIELD:	No. Copies ____
___ OTHER:	No. Copies ____

PROJECT DATA AND CONTRACT DATA

NAME OF PROJECT:_____ PROJECT NUMBER_____

LOCATION:_____ DATE:_____

CITY:_____ DRAWING NO.:_____

OTHER:_____

SYSTEM DESCRIPTION:_____

NOTE TO CONTRACTOR:

Submit five (5) copies of all information listed below for checking at least one week before scheduled start-up demonstration of the system. After all information has been approved by ENGINEER, give CITY a start-up demonstration as specified and have the CITY sign five copies of this form. After this has been done, a written request for a final inspection of the system shall be made.
MEMORANDUM:

This memo is for the information of all concerned that the CITY has been given a start-up demonstration on the system described above. This start-up demonstration consisted of the system operation, during which all major items of equipment were explained and demonstrated, and the following items were given to the CITY:

(a) City's copy of Operation and Maintenance Manual for the system containing approved submittal sheets on all items, including the following:

(1) Maintenance information published by manufacturer on equipment items.

(2) Printed warranties by manufacturers on equipment items.

(3) Performance verification information as recorded by Contractor.

(4) Check-out Memo on equipment by manufacturer's representative.

(5) Written operating instructions on any specialized items.

(6) Explanation of guarantees and warranties on the system.

(b) Prints showing actual "As-Built" conditions.

(c) A demonstration of the system in operation and of the maintenance procedures which will be required.

_____
(Name of CONTRACTOR)

By: _____
(Authorized Signature, Title & Date)

_____
(Name of Subcontractor)

By: _____
(Authorized Signature, Title & Date)

Operation and Maintenance Manual, Instruction Prints, Start-Up Demonstration and Instruction in Operation Received:

_____
(CITY)

By: _____
(Authorized Signature, Title & Date)

END OF SECTION

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SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 SUBSTANTIAL COMPLETION

A. The Work will not be substantially complete, and Contractor may not request substantial completion inspection unless the following submittals and work is completed:

1. All Operation and Maintenance manuals have been submitted.

2. Project Record Documents, including the signed and sealed Project Record Survey, are complete and have been submitted and reviewed to the requirements of Section 01720. Additionally, the Project Record Documents must be approved by the Engineer and the City prior to deeming the project Substantially Complete.

3. All areas to be used and occupied are safe, operable and complete.

4. All painting, finishes, fencing, cleanup, final grading, grassing, planting, sidewalk construction, paving and restoration efforts shall have been completed and are ready for inspection.

5. The water and sewer mains are installed and connected to the existing system.

6. All the following related tests/inspections and Florida Department of Environmental Protection permit clearances are complete and approved.

a. Pump Station Rehabilitation and Wastewater System Improvements:

1) Backfill density tests.

2) Hydrostatic pressure test.

3) Pump Station Start Up Testing

4) "Clearance For Use" Letter by BCEPGMD (DOH)

7. All deficiencies noted on inspection reports or nonconformances are corrected or the correction plan approved.

8. Until the Certificate of Substantial Completion is fully executed, the project shall not be deemed substantially complete.

B. When the conditions of paragraph 1.02 A of this section are met the Contractor shall submit to the Engineer:

1. A written notice that he considers the Work, or portion thereof, is substantially complete, and request an inspection.

2. A punch list of items to be corrected. (Uncompleted work which is not related to the safe, effective, efficient use of the Project may be allowed on the punch list with the Engineer's approval.)

C. Within a reasonable time after receipt of such notice, the Engineer will make an inspection to determine the status of completion.

D. Should the Engineer determine that the Work is not substantially complete:

1. The Engineer will promptly notify the Contractor in writing, giving the reasons therefor.

2. Contractor shall remedy the deficiencies in the Work and send another written notice of substantial completion to the Engineer.

3. The Engineer will within reasonable time, reinspect the Work. The Contractor will be liable for all reinspection fees.

E. When the Engineer finds that the Work is substantially complete, he will:

1. Schedule a walk-through of the project to include the Owner. Engineer shall determine the completeness of the punch list and readiness of the project for occupancy by the Owner.

2. Prepare and deliver to Owner a tentative Certificate of Substantial Completion with the tentative punch list of items to be completed or corrected before final inspection.

3. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when the Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected. Any incomplete work allowed on a punch list must be reinspected upon completion and any deficiencies found will be added to the punch list.

1.03 PROJECT CLOSEOUT

A. As construction of the project enters the final stages of completion, the Contractor shall, in accordance with the requirements set forth in the Contract Documents, attend to or have already completed the following items:

1. Placed water or sewer systems into service once FDEP or DOH clearances have been obtained.

2. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the City's "Punch" lists.

3. Make final submittals.

4. Attend to any other items listed herein or brought to the Contractor's attention by the City.

1.04 CLOSEOUT TIMETABLE

A. The Contractor shall establish dates for equipment testing, acceptance periods, and on-site instructional periods (as required under the Contract). Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the City, the Engineer, and their authorized representatives sufficient time to schedule attendance at such activities.

1.05 FINAL SUBMITTALS

A. Before the acceptance of the project major milestones for substantial completion, the Contractor shall submit to the Engineer (or to the City if indicated) certain records, certifications, etc., as listed in paragraph 1.02 A and as specified elsewhere in the Contract Documents. Missing, incomplete or unacceptable items, as determined by the Engineer or the City, shall indicate non-compliance with substantial completion major milestone dates. A partial list of such items appears below, but is shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:

1. Written Test results of project components.

2. Performance affidavits for equipment and materials.

3. Operation and Maintenance Manuals for equipment.

4. Record Drawings: Refer to Section 01720, Project Record Documents.

5. Written guarantees, where required.

6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

7. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.06 PUNCH LISTS

A. Final cleaning and repairing shall be scheduled upon completion of the project.

B. The Engineer will make his final inspection whenever the Contractor has notified the Engineer that the work is ready for the inspection. Any work not found acceptable and requiring cleaning, repair and/or replacement will be noted on the "Punch" list. Work that has been inspected and accepted by the Engineer shall be maintained by the Contractor, until final acceptance of the entire project.

C. Whenever the Contractor has completed the items on the punch list, he shall again notify the Engineer that it is ready for final inspection. This procedure will continue until the entire project is accepted by the Engineer. The "Final Payment" will not be processed until the entire project has been accepted by the Engineer and all of the requirements in paragraph 1.05 "Final Submittals" of this Section have been satisfied.

1.07 MAINTENANCE AND GUARANTEE

A. The Contractor shall comply with all maintenance and guarantee requirements of the Contract Documents.

B. Replacement of earth fill or backfill, where it has settled below the required finish grade elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private City or public agency releasing the City from further responsibility in connection with such repair or resurfacing. All repair work will be at the Contractor’s cost.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the City. If the Contractor fails to make such repairs or replacements promptly, the City reserves the right to do the Work and the Contractor and his surety shall be liable to the City for the cost thereof.

1.08 TOUCH-UP AND REPAIR

A. The Contractor shall touch-up and repair damage to all field painted and factory finished equipment. Touch-up of equipment panels, etc., shall match as nearly as possible the original finish. If in the opinion of the Engineer the touch-up work is not satisfactory, the Contractor shall repaint the item. Contractor shall also furnish additional paint as defined in the contract documents.

1.09 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the City will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 SCOPE OF WORK

This Section specifies the maintenance of the work site in a clean, orderly, hazard-free condition.

1.02 QUALITY ASSURANCE

A. Conduct cleaning and disposal operations in accordance with local ordinances and anti-pollutions laws. Rubbish, volatile wastes, and other construction wastes shall be neither burned nor buried on the work site, and shall not be disposed of into storm drains, sanitary drains, streams or other waterways.

B. Final cleaning shall be accomplished either by workmen experiences in cleaning operations or by professional cleaners.

PART 2 - PRODUCTS

2.01 ON-SITE WASTE CONTAINERS

Provide on-site waste containers for collection of waste materials, debris and rubbish. Storage requirements for environmentally hazardous materials are to be followed by the Contractor at all times.

2.02 CLEANING MATERIALS

Cleaning materials shall be as recommended by the manufacturer of the surface to be cleaned.

PART 3 - EXECUTION

3.01 SAFETY REQUIREMENTS

A. Maintain work site in accordance with local ordinances and anti-pollution laws applicable to work site cleanliness, and in a neat, orderly and hazard-free condition until final acceptance of the work. Catwalks, accessible underground structures, work site sidewalks and walkways adjacent to the work site shall be kept free from hazards caused by construction activities.

B. Store volatile wastes including rags in covered metal containers, and remove from work site daily. Prevent accumulations of wastes which create hazardous conditions.

C. Artificially ventilate spaces which are not naturally ventilated when volatile and noxious substances are being used in those spaces.

3.02 INTERIM CLEANING

A. Perform cleaning every workday for duration of the Work. Structures, grounds, and areas of the work site and public and private properties shall be maintained free from accumulations of waste materials and rubbish caused by construction operations on the work site. Place waste materials and rubbish in on-site containers.

B. Remove or secure loose material on open decks and on other exposed surfaces at end of each day's work or more often to maintain work site in hazard-free condition. Prevent dislodgement of materials due to wind and other forces.

C. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

D. Empty on-site waste containers whenever necessary so that trash overflow does not occur. Legally dispose of contents at either public or private dumping areas.

E. Control the handling of materials, debris and rubbish; do not drop or throw from heights.

F. Immediately remove spillage of on-site fuels, oil or construction-related material from hauling routes.

G. Perform cleaning operations so dust and other contaminants resulting from cleaning processes will not fall on wet, newly painted surfaces.

3.03 FINAL CLEANING

A. In preparation for final acceptance or occupancy, conduct final inspection of exposed interior and exterior surfaces, and of concealed spaces.

B. Remove grease, dust, dirt, rust stain on concrete floors, labels, fingerprints and other foreign materials from exposed interior and exterior finished surfaces. Flush down all parking level areas and stairs leaving such surfaces clean of all sand, laitances, etc.

C. Maintain cleaning operations until project has been finally accepted.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1- GENERAL

1.01 DESCRIPTION

A. Scope of Work: The Contractor is responsible for maintaining one record copy of:

1. Record Drawings.

2. Record Specifications.

3. Addenda.

4. Change Orders and other modification of the Contract.

5. Engineer's written orders or instructions.

6. Approved Shop Drawings, Product Data and Samples.

7. Field Test records.

8. Construction photographs.

9. As-built dimensions and elevations as recorded by the Contractor's Florida Registered Land Surveyor.

B. The records listed above are to be made available for the City's review at all times for all projects. All City requirements must be met by the Contractor prior to acceptance of Record Documents by the City.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain documents in a clean dry, legible condition and in good order. Do not use record documents for construction purposes.

1.03 RECORDS

A. During the life of the Contract the Contractor shall retain the services of a Florida Registered Land Surveyor who shall maintain records of the installation, including all deviations from Plans and Specifications.

B. Measure and Record all information for all projects concurrently with construction progress.

C. Submit redlines, partially completed as-built plan sheets and fully complete as-built Plan sheets, all as required by and satisfactory to, the City on a monthly basis or such lesser interval as directed by the City.

D. Label each document "PROJECT RECORD" in neat large printed letters.

1. Do not conceal any work until as-built information is recorded by the Contractor's surveyor and, if so required, by the City surveyor.

2. All locations for future connections or tie-ins shall be left unburied and uncovered until the Contractor's Florida Registered Land Surveyor measures and records the as-built information.

3. Restrained pipe, end line valves, thrust blocks shall be left uncovered for the last complete length. In line valves and tees shall be left exposed for one length on both sides plus the face end. Measure and record the elevation, horizontal and vertical alignment, and inclination for these items.

4. For all projects, the Contractor's Florida Registered Land Surveyor (FRLS) shall maintain exact and extensive records of any deviations from the Plans or Specifications. These records shall be satisfactory to the Engineer, whose decision shall be final, and sufficient to allow the production of accurate as-built Plans which correctly and completely portray the work as constructed.

5. For all projects, the Contractor's Florida Registered Land Surveyor shall record data as follows during the entirety of construction.

a. For facility (eg a water or sewage plant, pumping station, or similar site if so designated by City) projects, record as-built dimensions and elevations every twenty-five feet or portion thereof along the pipeline and at every abrupt change in direction of the new line.

b. For pipeline projects, constructed in the public right-of-way dimensions and elevations every one hundred feet or portion thereof along the pipeline and at every horizontal and vertical change in direction.

c. Identify separations with all horizontal and vertical distances identified between existing utilities and the crossing location of the new utility such that FDEP/DOH requirements are documented as having been met by the Contractor. In all cases record locations and elevations for each valve, fitting, service line, fire hydrant, water sampling point, utility poles adjacent to the proposed line, overhead wires crossing the ditch line (approximate height above grade) and other appurtenances along the pipeline.

d. The identity, dimensions, location and elevation of any existing utility crossing the proposed line and so immediately adjacent to the new line as to be exposed by the excavation shall also be recorded. Locate, excavate expose and record the same data for any utility shown in the plans whose proximity to the proposed pipeline could affect the certification requirements of the new installation. Note that in instances of a very wide ditch due to ground conditions the recording of data for adjacent, paralleling, utilities shall only be required for lines which come within three feet of the outside of the pipe being installed unless otherwise ordered by the City who's decision shall be final.

e. Without exception, for all thrust blocks, the top elevation, outer dimensions, thickness of the block, length and location of any sheet piling, if used, shall be recorded by the Contractor's FRLS.

f. Specific locations and elevation of equipment, the buildings and miscellaneous items installed inside them shall be recorded as applicable and as required by the City.

g. Without exception, where the substitution of another piece of equipment for that shown on the Plans has been allowed, the footprint, clearance and elevation dimensions shall be recorded by the Contractor's FRLS and these changes shall be accurately and thoroughly portrayed on the as-built plans.

h. The Contractor's Licensed Surveyor shall prepare from the field data, as-built record drawings showing correctly, completely and accurately the installation, embracing all changes and deviations made during construction, including all construction variances, to reflect the work as it was constructed.

i. Record Drawings shall be prepared as specified hereinafter.

j. If the City or Engineer determines that the Drawings are not acceptable, they will be returned to the Contractor with a cover letter noting the deficiencies and/or reasons for the disapproval. Contractor shall have ten calendar days to correct all exceptions taken by the City and resubmit as-built record drawings to the City for final acceptance.

1.04 DRAWINGS

A. During the life of the Contract, maintain records of all deviations from the Plans and Specifications and prepare therefrom As-Built Record Drawings showing correctly and accurately all changes and deviations made during construction to reflect the work as it was actually constructed.
It is the responsibility of the Contractor to check the As-Built Record Drawings for errors and omissions prior to submittal to the City and certify in writing that the As-Built Record Drawings are correct and accurate, including the actual location of all piping.

B. Legibly Mark to Record Actual Construction: All data as previously specified for all installations by the Contractor's FRLS. For on-site structures and facilities work the Contractor's Florida Registered Land Surveyor shall record:

1. Depths of various elements of foundation in relation to finish first floor and datum plane.

2. All exposed and underground piping and ductwork with elevations and dimensions and locations of valves, pull boxes, etc. Changes in location. Horizontal and vertical locations of underground utilities and appurtenances, measured from permanent reference points, plant survey grids, property lines and similar.

3. Field changes in dimensions, locations and details.

4. Changes made by Engineer's written instructions or by Change Order.

5. Details not on original Plans.

6. Equipment and piping relocations.

7. Major architectural and structural changes in structures, including tanks.

8. Record drawings shall be prepared as specified hereinafter.

C. Specifications and Addenda: Legibly mark each section to record the following:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.

2. Changes made by Engineer's written instructions or by Change Order.

D. Approved Shop Drawings: Provide record copies for system diagrams and drawings together with each element of process equipment, piping, electrical system and instrumentation system.

1.05 SUBMITTALS

A. Accompany submittal with transmittal letter in duplicate, containing:

1. Date.

2. Project title and number.

3. Contractor's name and address and phone number.

4. Title and number of each Record Document.

5. Signature of Contractor or his authorized representative.

B. Record Drawings with five hard copies which have been signed and sealed by the surveyor shall be submitted to the City for the Engineer's review. City CAD standards should be followed. Drawings shall conform to recognized standards of drafting and the minimum technical standards as set forth by the Board of Professional Surveyors and Mappers, shall be neat, legible and on 24-inch by 36-inch plans.

These materials shall be submitted to the City for the Engineer's review as a prerequisite for payment during the course of construction as previously specified and final, complete sets of documents within ten calendar days following the completion date of successful testing of all mains, equipment and appurtenances under this Contract. Final acceptance will not be made until the set of as-built record drawings and five sets of signed and sealed CAD files and prints have been approved and accepted by the City and the Engineer.

1. In cases where a portion of a pipeline system or parts of a process system are put into service, the above conditions shall apply for the in-service portion and acceptance of work constructed shall be withheld until the as-built drawings are accepted by the City.

2. As-Built Record Drawings, as prepared by the Contractor's Florida Registered Land Surveyor and submitted by the Contractor, shall comply with following criteria and standards:

a. Title block must show the Contract or Project Title (as applicable); Contract number; Contractor's name; Engineer of Record's name; Surveyor's name and address; date; location; and where appropriate to the work, size and type (i.e. water main, sanitary gravity main, sanitary force main) of main.

b. Baselines or centerlines must be tied to section corners, monument line and right-of-way lines.

c. Pipeline must be tied to baseline or centerline with stations and offsets.

d. Baselines or centerlines must show bearings or deflection angles, or delta, radius, chord and arc length for curves.

e. Show all horizontal curve data, including point of curvature (PC) and point of tangency (PT) stations or radial bearing.

f. Stationing must be the same as shown on construction drawings and must be tied to Section corners, centerline intersections and all other pertinent control points within the Project. All such pertinent points shall

have their stationing shown and where there is dual stationing for a point, both stations shall be called out.

g. Identify all streets by name or number and show stationing at all intersecting streets.

h. Refer to vertical datum plane and identify the location, elevation and source supplying the bench mark used.

i. Tie easement lines to survey baseline or platted centerline and right-of-ways.

j. Show horizontal and vertical locations of all fittings, deflections, or at any significant change of direction, and at a maximum of 100-foot intervals along the pipeline for off-site (eg in the public right-of-way) and at maximum 25-foot intervals for on-site (eg on a facility such as a pump station or plant) work.

k. On all pipe fittings of 36-inch diameter or over, (i.e. tees, bends, crosses, wyes, increasers/decreasers, bevels) elevations must be taken at the end and center points to reflect the true elevation and attitude of the fitting.

l. Elevations of natural ground or pavement over the pipeline must be shown at each position where the pipe elevation is shown and at intervening high and low points.

m. Manhole rim and valve box rim elevations must be shown.

n. Show all invert and bottom elevations in manholes and valve vaults or boxes. Show all invert and bottom elevations together With pipe size, and where it can be determined, pipe material, for existing structures having pipes which cross the pipeline being constructed.

o. Locations and elevations together with diameter, thickness and material of all casings.

p. Location, top and bottom elevations of all sheeting left in place.

q. Coordinate values used inside plants shall be the local City established coordinate systems referenced to the property boundary.

r. State plane coordinate values for all new valves and manholes; on existing valves and manholes at points of connection or closest to the point of connection and the point of connection itself.

s. All FDEP/DOH separation requirements are to be provided on the as-built plans and to meet FDEP/DOH standards.

3. Certification: The Contractor shall certify on as-built record drawings all other actual constructed details and information as may be required by the City including but not limited to:

a. Valves must be identified by size, type, end condition; and on valves 16-inch or larger, the manufacturer's name and number of turns required to open or close the valve.

b. Show calculated pipeline percent of grade between manholes of gravity systems.

c. Types and sizes of sheeting and piling together with measured and complete; location, dimensional and elevation data on any pile caps, tie backs, anchors, whalers or other appurtenant structures left in place.

C. Drawings on Magnetic Media: The City and Engineer reserves the right to require submittal of signed and sealed as-built drawings in AutoCAD for Windows Release 14 format or later. Graphical information contained on magnetic media shall be the same as provided on plan sheets.

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION

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SECTION 01730

OPERATING AND MAINTENANCE DATA

I. SCOPE OF WORK:

A. Scope of Work:

1. Compile product data and related information appropriate for Owner's maintenance and operation and manufacturer's certifications for all products furnished under Contract.

a. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.

2. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

3. Contractor to fill-out and complete asset information spreadsheet, Tables and B, for all equipment requiring O&M manuals. Final copy of Table 01730-B shall be submitted in electronic form (Excel spreadsheet).

II. IMPLEMENTATION

A. Manual: Preparation and Description

1. Preparation of data shall be done by personnel:

a. Trained and experienced in maintenance and operation of described products.

b. Familiar with requirements of this Section.

c. Skilled as technical writer to the extent required to communicate essential data.

d. Skilled as draftsman competent to prepare required drawings.

2. Description

a. Prepare data in the form of an instructional manual for use by City's personnel.

b. Format:

i. Size: 8-1/2 inches x 11 inches.

ii. Paper: 20 pound minimum, white, for typed pages.

iii. Text: Manufacturer's printed data, or neatly typewritten.

c. Drawings:

i. Provide reinforced punched binder tab, bind in with text.

ii. Reduce larger drawings and fold to size of text pages, but do not use drawing prints larger than 14 inches x 17 inches.

d. Provide fly-leaf for each separate product, or each piece of operating equipment.

i. Provide typed description of products and major component parts of equipment.

ii. Provide indexed tabs.

e. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:

i. Title of Project.

ii. Identity of separate structure as applicable.

iii. Identity of general subject matter covered in the manual.

3. Binders:

a. Commercial quality three-post binders with durable and cleanable plastic covers.

b. Maximum post height: 2 inches.

c. When multiple binders are used, correlate the data into related consistent groupings.

4. Content

a. At a minimum provide a neatly typewritten table of contents for each volume, arranged in systematic order.

i. CONTRACTOR, name of responsible principal, address and telephone number.

ii. A list of each product required to be included, indexed to content of the volume.

iii. List, with each product, name, address and telephone number of:

aa. Subcontractor or installer.

ab. A list of each product required to be included, indexed to content of volume.

ac. Identify area of responsibility of each.

ad. Local source of supply for parts and replacements.

b. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

c. Product Data:

i. Include only those sheets which are pertinent to the specific product.

ii. Annotate each sheet to:

aa. Clearly identify specific product or part installed.

ab. Clearly identify data applicable to installation.

ac. Delete references to inapplicable information.

d. Supplemental product data: as necessary to clearly illustrate:

i. Relations of component parts of equipment and systems.

ii. Control and flow diagrams.

e. Written text, as required to supplement product data for the particular installation.

i. Organize in consistent format under separate headings for different procedures.

ii. Provide logical sequence of instructions of each procedure.

f. Coordinate drawings with information in Record Documents to assure correct illustration of completed installation.

g. Do not use Record Documents as maintenance drawings.

h. Copy of each warranty, bond and service contract issued.

i. Provide information sheet for City's personnel:

aa. Proper procedures in event of failure.

ab. Instances which might affect validity of warranties or bonds.

i. Final manual shall include both manufacturer's certifications (Specification 01650) and a copy of all training documents provided during training sessions.

B. Manual for Materials and Finishes

1. Submit six copies of complete manual in final form.

2. Content: for architectural products, applied materials and finishes.

a. Manufacturer's data, giving full information on products.

i. Catalog number, size, and composition.

ii. Color and texture designations.

iii. Information required for reordering special manufactured products.

b. Instructions for care and maintenance.

i. Manufacturer's recommendation for types of cleaning agents and methods.

ii. Cautions against cleaning agents and methods which are detrimental to product.

iii. Recommended schedule for cleaning and maintenance.

3. Content: for moisture protection and weather-exposed products.

a. Manufacturer's data, giving full information on products.

i. Applicable standards.

ii. Chemical composition.

iii. Details of installation.

b. Instructions for inspection, maintenance and repair.

4. Additional requirements for maintenance data: As requested by the Engineer.

C. Manual for Equipment and Systems

1. Submit six copies of complete manual in final form.

2. Content, for each unit of equipment and system, as appropriate:

a. Description of unit and component parts.

i. Function, normal operating characteristics, and limiting conditions.

ii. Performance curves, engineering data and tests.

iii. Complete nomenclature and commercial number of replaceable parts.

b. Operating procedures:

i. Start-up, break-in, routine and normal operating instruction.

ii. Regulation, control, stopping, shut-down and emergency instructions.

iii. Summer and winter operating instructions.

iv. Special operating instructions.

c. Maintenance procedures:

i. Routine operations.

ii. Guide to "trouble-shooting".

iii. Disassembly, repair and reassembly.

iv. Alignment, adjusting and checking.

d. Servicing and lubrication required.

e. Manufacturer's printed operating and maintenance instructions.

f. Description of sequence of operation by control manufacturer.

g. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

i. Predicted life of parts subject to wear.

ii. Items recommended to be stocked as spare parts.

h. As installed control diagrams by controls manufacturer.

i. Each subcontractor's coordination diagrams.

j. Charts of valve tag numbers, with location and function of each valve.

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

l. Certificate of Demonstration.

3. Content, for each electric and electronic system, as appropriate:

a. Description of system and component parts.

i. Function, normal operating characteristics, and limiting conditions.

ii. Performance curves, engineering data and tests.

iii. Complete nomenclature and commercial number of replaceable parts.

b. Circuit directories of panel boards.

i. Electrical service

ii. Controls

iii. Communications

c. As installed color coded wiring diagrams.

d. Operating procedures:

i. Routine and normal operating instructions.

ii. Sequences required.

iii. Special operating instructions.

e. Maintenance procedures:

i. Routine operations.

ii. Guide to "trouble-shooting".

iii. Disassembly, repair and reassembly.

iv. Adjustment and checking.

f. Manufacturer's printed operating and maintenance instructions.

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

h. Other data as required under pertinent sections of specifications.

4. Prepare and include additional data when the need for such data become apparent during instruction of City's personnel.

D. Submittal Schedule

1. All submittal documents shall be provided in both hardcopy, bounded in separate three-ring binders, indexed, tabbed with sectional dividers, and no larger than 8½-inch x 11-inch and bookmarked electronic media - Adobe® Acrobat® portable document format. Two sets of hardcopy and two sets of electronic media shall be provided. All drawings shall be provided in both hardcopy, bounded, indexed, and no larger than 11-inch x 17-inch and bookmarked electronic media - Autodesk® AutoCAD® file format AND Adobe® Acrobat® portable

document format. Two sets of hardcopy and two sets of electronic media shall be provided.

2. Submit three (3) copies of completed data in final form no later than 30 days following the Engineer's review of the last shop drawing and/or other submittal specified under Section 01340.

    a. One copy will be returned with comments to be incorporated into final copies.

3. Submit six (6) copies of approved manual in final form and PDF formats to the Engineer within 30 days after the reviewed copy is received.

4. Append six (6) copies of addendum to the operation and maintenance manuals as applicable and certificates as specified and PDF format within 30 days after final inspection and start-up testing.

E. Instruction of City's Personnel

1. Prior to final inspection or acceptance, the manufacturer's representative shall fully instruct City's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

2. Operating and maintenance manual shall constitute the basis of instruction.

    a. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

TABLE 01730-A

REQUIRED O&M MANUALS
(minimum requirements)

Specification Section	Equipment
08350	Access Hatch Doors
09900	Painting
09900, 09901, 09907	Coatings/Linings
11208	Submersible Wastewater Pumps
15050	Plug Valves
15050	316 SST Ball Valves
15050	Air Release Valves
15050	Check Valves
15050	Pressure Gauges
15050	PVC Ball & Check Valves
Other	All other equipment items at the discretion of the City and Engineer

PUMP STATIONS D-10 & D-11 FLOW ANALYSIS AND REDESIGN PROJECT No. 12202

TABLE 01730-B

ASSET INFORMATION SPREADSHEET

Equipment	Equipment Description/Basic Operation	Model	Serial Number	Vendor	Manufacturer	Warranty End Date	Purchase Date	Purchase Cost	Install Date	Replacement Cost (estimate)	HP/Amps/ Inches

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Compile specified warranties and bonds, as per the General Conditions and as specified in these Specifications.

2. Co-execute submittals when so specified.

3. Review submittals to verify compliance with Contract Documents.

4. Submit Warranties and Bonds to the Engineer for review.

B. Related Work Described Elsewhere:

1. Conditions of the Contract: Performance Bonds and Payment Bond.

2. Special Project Procedures: Section 01100.

3. Project Closeout: Section 01700.

1.02 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product of work item.

2. Firm, with name of principal, address and telephone number.

3. Scope.

4. Date of beginning of warranty, bond or service and maintenance contract.

5. Duration of warranty, bond or service maintenance contract.

6. Provide information for Owner's personnel:

a. Proper procedure in case of failure.

b. Instances which might affect the validity of warranty or bond.

7. Contractor, name of responsible principal, address and telephone number

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8-1/2 inches x 11 inches, punch sheets for standard three-post binder

a. Fold larger sheets to fit into binders.

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

a. Title of Project and Name of Contractor.

C. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of two inches.

1.04 WARRANTY SUBMITTALS REQUIREMENTS

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (l) year plus time equipment is not functional to the Owner, unless otherwise specified, commencing at the time of final acceptance by the Owner.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Division 15 and which lists for more than $500.00. The Owner reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide the warranty described above commencing at the date of substantial completion, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two-year warranty from the manufacturer shall not relieve the Contractor of the one-year warranty starting at the time of the Owner's acceptance of the equipment.

D. The Owner shall incur no labor or equipment cost during the guarantee period.

E. Guarantee shall cover all necessary labor, equipment and replacement parts resulting from faulty or inadequate design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02050

DEMOLITION AND MAINTENANCE OF SERVICE DURING CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. This Section includes furnishing all labor, materials, permits, notifications, equipment and incidentals required for the demolition and disposal of all materials and equipment designed for removal. Such materials and equipment and include pumps, pipe, valves, supports, control panels, blower for exhaust fans, and other related appurtenances.

2. These Specifications call attention to certain activities necessary to maintain and facilitate operation during and immediately following construction and do not purport to cover all of the activities necessary. The Contractor shall exercise due care to maintain continuous operation of the existing facilities and minimize operation inconvenience. In accordance with this requirement, a Demolition and Removal Plan shall be developed and submitted in accordance with Paragraph 1.06 herein, Specification 11312: Collection System Bypass and Section 01310 – Project Scheduling – Major Projects.

3. Demolition includes, but is not limited to:

a. Removal of the top slab of the wet well, pumps, piping, valves, guide rails, hatches, electrical conduits, wiring, control panels, RTU, MCC, VFDs, junction boxes, pavement, and other items as shown on the Drawings or necessary to complete the Project.

b. Disposal of nonsalvageable and excess unacceptable material as specified below.

c. Off-site disposal of excess and unacceptable materials.

4. The Contractor shall examine the Contract Documents, visit the project site and determine the extent of the work affected therein, and all conditions under which the work will be performed.

1.02 PERMITS AND NOTICES

A. Permits and Licenses: Contractor shall obtain all necessary permits and licenses for performing the work and shall furnish a copy of same to the Owner prior to commencing the Work. The Contractor shall comply with the requirements of the permits.

B. Notices: Contractor shall issue written notices of planned demolition at least one month prior to any demolition to all residence in surrounding subdivision, along with companies or local authorities owning utility conduit, wires or pipes running to or through the project site. Notices to residences shall include a project description, estimated duration and anticipated traffic constriction for the project. Drafts of said notices shall be submitted to the Engineer.

C. Utility Services: Contractor shall notify utility companies or local authorities furnishing gas, water, electrical, telephone, cable television, or sewer service to remove any equipment owned by them in structures to be demolished and to remove, disconnect, cap, or plug their services to facilitate demolition.

1.03 CONDITIONS AND STRUCTURES

A. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable, however, minor variations within the structure may occur prior to the start of demolition work.

1.04 RULES AND REGULATIONS

A. The Florida Building Code and applicable codes shall control demolition, modification, or alteration of the existing buildings or structures.

B. No blasting shall be done on site. The Contractor shall not bring or store any explosives on site.

C. The Contractor shall dispose of all wastewater contents (including sediment) and discharge structure in accordance with FDEP Rules and Regulations.

1.05 DISPOSAL OF MATERIAL

A. Salvageable material shall become the property of the Owner, if the Owner requests any specific item. The Contractor shall dismantle all the materials to such a size that they can be readily handled, and deliver any of the salvageable materials requested by the Owner to a designated storage area on-site, as directed by the Owner.

B. The following examples are the types of material of which the Owner may maintain ownership:

1. Valves greater than 3 inches in diameter.

2. Pumps, pump stands, control panels, wiring, and winches.

3. Control panels and wiring.

4. Standby generator set.

5. Bricks from driveways (brick shall be cleaned and neatly palletized for transport).

C. Transportation of City and salvaged equipment off site:

1. The following equipment shall be loaded and transported from the D10 and D11 lift station sites to the City's facility of choice:

a. Existing Pumps, Control Panels, VFDs

D. Any material that the Owner rejects shall become the Contractor's property and must be removed from the site, transported, and disposed of by the Contractor.

E. Concrete, concrete block, and unsalvageable bricks shall be hauled to a waste disposal site by the Contractor.

F. The storage of or sale of removed items on the site shall not be allowed.

1.06 SUBMITTALS

A. Submit to the Engineer within twenty (20) days after the Notice-to-Proceed for approval, five (5) copies of the proposed Demolition and Removal Plan for the structures and modifications as shown on the Drawings or as specified herein prior to the start of Work. Include a detailed schedule showing the coordination of bypassing, shutoff, capping and continuation of utility service as required. The Demolition and Removal Plan shall include as a minimum, the following:

1. A detailed sequence of demolition and removal work to ensure the continued conveyance of wastewater service and compliance with regulatory agency requirements, as well as the expeditious completion of the Contractor's work.

2. A list of all activities, including Owner activities, bypass activities and shutdowns, required to complete the work.

3. Evidence (by signature) of review of the lift station manager of the work plan.

4. The sequence of demolition and renovation of existing facilities shall be in accordance with the approved Demolition and Removal Plan as specified in this Section. The Contractor is solely responsible for construction and demolition sequencing of the Work.

5. Submit signed and sealed demolition/shoring drawings and calculations prepared by a professional engineer, registered in the State of Florida.

B. Before commencing demolition work, all modifications necessary to bypass the affected structure shall be completed as detailed in Section 11312: Collection System Bypass. Contractor shall coordinate with the Owner's personnel to determine the locations of the affected equipment, valves and fittings at least 48 hours in advance of any demolition work.

C. The above procedure shall be followed for each individual demolition operation.

1.07 TRAFFIC AND ACCESS

A. Conduct demolition and modification operations, and the removal of equipment and debris to ensure minimum interference with roads, streets, and sidewalks both on-site and off-site and to ensure minimum interference with occupied or used facilities.

B. The Contractor shall at all times maintain safe and convenient access to the existing site.

C. Do not close or obstruct streets or walks without permission from the Owner and Engineer. Provide alternate traffic routes around closed or obstructed access ways.

D. Special attention is directed towards maintaining safe and convenient access to the existing facilities remaining in service by City personnel. Relocation of the Contractor's materials or equipment due to uncoordinated interruption will be at the Contractor's expense.

1.08 DAMAGE

A. Promptly repair damage caused to adjacent facilities by demolition operations at no cost to the Owner.

1.09 UTILITIES

A. Maintain existing utilities to remain in service and protect against damage during demolition operations.

B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Owner and the Engineer. Provide temporary service during interruptions to existing utilities as acceptable to the Owner.

C. The Contractor shall cooperate with the Owner to shut off utilities serving structures as required by demolition operations.

D. The Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the discontinuance or interruption of all public and private utilities or services under the jurisdiction of the utility companies.

E. All utilities being abandoned shall be disconnected and terminated at the service mains in conformance with the requirement of the utility companies or the municipality owning or controlling them.

1.10 POLLUTION CONTROL

A. For pollution control, use water sprinkling, temporary enclosures, and other suitable methods as necessary to limit the amount of dust and dirt rising and scattering in the air to the lowest level of air pollution practical for the conditions of work. Comply with the governing regulations.

B. Take all necessary measures and means to provide dust, dirt, debris and paint abatement methods to prevent damage to surrounding properties, on-site structures, and private property.

C. Clean on-site structures and improvements of all dust, dirt and debris caused by demolition operations as directed by the Engineer. Clean or repair all off-site property as shown on the Drawings and specified herein. Return areas to conditions existing prior to the start of work.

1.11 QUALITY CONTROL

A. Protect all existing materials and equipment to be salvaged or reused from damage.

B. No above-ground pipes, junction boxes, conduits, or wires are to be left abandoned.

C. Leave all exposed ends of all pipe and conduit or junction boxes covered and safe.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK

A. The sequence of demolition and renovation of existing facilities shall be in accordance with the approved demolition and removal plan as specified in Section 01014 – Construction Sequence and Section 01310 – Project Schedule – Major Projects.

B. The Contractor shall have a basic understanding of the operation of the existing pump station before preparation of the Demolition and Removal Plan to maintain facility operation and reliability during the demolition process.

C. Show the complete sequence of construction by activity and by structure. Utilize proposed sequence of work in Section 01014 – Construction Sequence as a basis for the detailed sequence of construction.

3.02 REMOVAL OF EXISTING EQUIPMENT, PIPING, AND APPURTENANCES

A. Subject to the constraints of maintaining the existing facility in operation, existing equipment, non-buried valving and piping, and appurtenances not necessary for the operation of the new facility shall be removed as shown or indicated on the Drawings.

B. All equipment, piping, and appurtenances shall be cleaned, flushed, and drained. Equipment to be retained by the Owner as specified in Paragraph 1.05 above shall be dismantled sufficiently to permit thorough cleaning and draining. All valves shall be left open.

3.03 BURIED PIPING

A. Remove all demolished and abandoned buried piping encountered during excavation unless otherwise directed by Engineer.

END OF SECTION

SECTION 02080

ABANDONMENT, REMOVAL AND DISPOSAL OF
EXISTING PIPE REMOVED FROM SERVICE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of work: Furnish all labor, materials, equipment and incidentals required to abandon or place out of service, remove, salvage and/or dispose of existing force main pipelines as shown on the Drawings and as specified herein.

B. Definitions:

1. Pipeline Abandonment/Pipeline Placed out of Service - isolate from active pipelines, remove from service, dispose of pipeline contents, plug pipeline, fill pipeline with specified cementiceous material, leave pipe in place.

2. Pipeline Removal - isolate from active pipelines, remove from service. Dispose of pipeline contents, remove pipe, valves, fittings, dispose or stockpile removed materials as required and provide additional clean backfill as necessary.

1.02 QUALITY ASSURANCE

A. Permits and Licenses: Contractor shall obtain and pay respective fees for all necessary permits and licenses for performing the work and shall furnish a copy of same to the Engineer prior to commencing the work. The Contractor shall comply with the requirements of the permits with the exception of City permits being paid for by the City.

B. Notices: Contractor shall issue written notices of planned work to companies or local authorities owning utility conduit, wires or pipes running to or through the project site. Copies of said notices shall be submitted to the Engineer.

C. Standards:

1. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR Part 61, Subpart M, latest revision.

2. Occupational Safety and Health Act, 29 CFR.

3. The Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection Rule.

4. Florida Statutes.

D. Quality Control

1. It shall be the responsibility of the Contractor to provide supervision and inspections to ensure that the existing piping is removed and disposed, salvaged or abandoned or placed out of service as designated in the Drawings and as specified herein.

1.03 SUBMITTALS

A. Shop Drawings - Submitted to the Engineers acceptance prior to construction in accordance with Section 01340 for the following:

1. Grout – See Section 03600 requirements.

2. Caps and plugs.

PART 2 - MATERIALS (NOT USED)

PART 3 - EXECUTION

3.01 REMOVAL, ABANDONMENT AND DISPOSAL

A. General: Existing piping designated on the Drawings to be removed shall be exposed and removed by the Contractor in accordance with the requirements specified herein.

B. Potential types of pipe to be removed and/or abandoned in place or placed out of service:

1. Ductile Iron/Cast Iron, PVC, PE, AC, PCCP, Steel or HDPE Mains including air lines or other mains as shown on the plans or required to be removed within the corridor limits.

C. Removal and Disposal:

1. Pipe designated to be removed and disposed by the Contractor shall be completely drained and the contents properly disposed. The pipe shall then be completely removed from the site, including fittings, valves other in-line devices.

2. The Contractor shall be required to submit, obtain and pay for all necessary permit fees for piping removal and disposal with the exception of City permits being paid for by the City.

3. If manufacturer’s representatives are required for portions of piping that are to be removed on the plans (such as but not limited to PCCP piping), the Contractor shall be required to coordinate and pay for all costs associated with the manufacturer’s representatives review, field review, submittal documents and other efforts as necessary for the piping removal and/or replacement or repairs.

D. Removal of material to be salvaged:

1. Pipe, fire hydrants, and valves to be removed and salvaged as directed by the City shall be completely drained and the contents properly disposed. The pipe shall then be thoroughly pressure washed, palletized on wooden skids to a dimension not exceeding the recommendation of the manufacturer, and conveyed to the City at the location designated by the City at no cost to the City.

E. Abandonment/Placed out of Service:

1. All pipe designated to be abandoned on this project shall be left in place and placed out of service. Piping that is 6-inches in diameter and larger shall be filled with grout in accordance with Section 03600, Grouting.

2. Plugs: Pipe to be grouted shall be capped or plugged with a fitting. All caps and plugs shall be submitted to the Engineer for approval. Existing pipe shall be properly restrained per the restrained joint table requirements with thrust collars or manufactured restraints based on conditions that result from cutting pipes and/or closing valves to grout pipe to be abandoned or placed out of service.

END OF SECTION

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SECTION 02090

SOIL BORINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Soil boring data consisting of reproductions of boring logs were performed by the City for the Contractor's use and information. A copy of the complete soils report is included in the Appendices of these Specifications.

B. The subsurface information contained herein was obtained for design purposes and may not be an adequate representation of actual conditions for project construction. Information shown, including water levels, represents existing conditions at the specific boring locations at the time the borings were made. All risks resulting from use or interpretation of the subsurface data shown shall be borne by the Contractor.

C. The data is included for information only and may be useful as a guide in estimating and planning the work.

D. If additional subsurface information is required by the Bidder/Contractor, it shall be the Bidder's/Contractor's responsibility to obtain such data at no additional cost to the City.

E. Refer to the General Conditions for further explanation of subsurface conditions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 02100

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials, equipment and labor necessary to complete all clearing and grubbing as specified herein and in accordance with the Drawings.

B. The Contractor shall box and protect all trees, shrubs, lawns, and landscaping. Any damaged trees or landscaping shall be restored at the Contractor's cost.

1.02 STANDARDS AND REGULATIONS

A. The Contractor shall comply with all state, county and local regulations regarding disposal of debris resulting from the clearing and grubbing operation.

B. The Contractor shall dispose of debris resulting from the clearing and grubbing operation at off-site locations in a lawful manner.

1.03 PROTECTION OF PERSONS AND PROPERTY

A. All work shall be performed in such a manner to protect all personnel, workmen, pedestrians, and adjacent property and structures from possible injury or damage.

B. Required wind load calculation for equipment mounted outside. Contractor to submit equipment support detail for approval.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. The Work specified in this section consists of clearing and grubbing within the areas required in the easements and right-of-ways to install the pipeline and appurtenances. The Work shall include the disposal of the resultant products and debris in areas provided by the Contractor unless noted otherwise.

B. Property obstructions which are to remain in place, such as buildings, sewers, drains, pipelines, conduits, poles, walls, posts, bridges, etc., are to be carefully protected from

injury and are not to be displaced, except for unusual cases when so specified by the Engineer.

C. Standard clearing and grubbing shall consist of the complete removal and disposal of all trees, shrubs, timber, brush, stumps, roots, grass, weeds, rubbish and other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas.

D. Excavation resulting from the removal of trees, roots, and the like shall be filled with suitable material, as approved by the Engineer, and thoroughly compacted per the requirements contained in Section 02222, Excavation and Backfill for Utilities and Structures.

3.02 DISPOSAL OF MATERIALS

A. Timber, stumps, muck, brush, roots, rubbish and other objectionable material resulting from clearing and grubbing shall be disposed of in a lawful manner, off site by the Contractor.

B. Burning of any debris resulting from the clearing and grubbing work will not be permitted at the site.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and permit work to be performed under dry and stable conditions. Work to be done as part of dewatering includes, but is not limited to:

1. Lower the groundwater level.

2. Lower hydrostatic pressure.

3. Sampling and discharge requirements.

4. Prevent surface water from entering the excavation during construction.

5. Implement erosion control measures for disposing of discharge water.

B. Groundwater within the excavation area shall be lowered to at least 1 foot below the lowest excavation levels as specified and as indicated.

C. Common groundwater recharge methods include, but are not limited to, deep wells, large sumps or any combination thereof.

D. The Contractor shall obtain the required permits and pay any associated permit fees for the discharge from the Contractor's dewatering systems in accordance with Broward County and South Florida Water Management District (SFWMD) requirements and all other jurisdictional agencies as necessary. The Contractor shall conform with all permit requirements. The Contractor is to obtain the listing of potentially contaminated sites per the Broward County contaminated site database. As their website is updated regularly, the Contractor shall be responsible to review the latest contaminated site listing and allow time for any initial monitoring, dewatering sampling/testing and subsequent permitting time frames if there is evidence of groundwater contamination in the dewatering samples. No delay claims will be allowed for the Contractor's lack of initial due diligence and/or installation of monitoring wells for sampling of dewatering discharge if not implemented prior to commencement of construction such that necessary measures and permitting efforts/submittals can be performed without impact to the project schedule.

1.02 RELATED WORK

A. Division 2 specifications.

1.03 SHOP DRAWINGS/SUBMITTALS

A. Submit the following in accordance with Section 01340:

1. Qualification of the Contractor’s dewatering specialist's or firm's qualifications a minimum of four (4) weeks prior to execution of any dewatering. The submittal shall include, but not be limited to:

a. Qualifications of specialist's or firm's Registered Professional Engineer as specified in herein.

b. Qualifications of specialist's or firm's field representative, as specified herein, who shall oversee the installation, operation and maintenance of the dewatering system.

2. Submit a dewatering plan at least two weeks prior to start of any dewatering operation. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:

a. Dewatering plan and details stamped and signed by a Registered Professional Engineer.

b. Certificate of Design: Refer to Section 01340.

c. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.

d. Detailed description of dewatering, maintenance, and system removal procedures.

e. Monitoring plan and details, including, but not limited to, number and locations of observation wells, and geotechnical instruments such as settlement markers and piezometers, and frequency of reading the monitoring devices.

f. Erosion/sedimentation control measures, and methods of disposal of pumped water. Sampling of dewatering discharge and meeting the required permitting agency parameters.

g. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.

h. List of assumptions made for design of dewatering and for groundwater recharge systems, including but not limited to groundwater levels, soil profile, permeability, and duration of pumping and or recharge.

i. Turbidity measurements in receiving waters as required by the permit. A turbidity control and monitoring where discharge is to a body of water.

3. Measurement records consisting of observation well groundwater records and the geotechnical instrumentation readings within one day of monitoring.

4. A modified dewatering plan within 24 hours, if open pumping from sumps and ditches results in boils, loss of fines, sinkholes or softening of the ground.

1.04 QUALITY ASSURANCE

A. Employ the services of a dewatering specialist or firm having the following qualifications:

1. Have completed at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years.

2. Retain the services of a Florida Registered Professional Engineer having a minimum of five (5) years of experience in the design of well points, deep wells, or equal systems.

3. Retain the services of a field representative having a minimum of five (5) years of experience in installation of well points, deep wells, or equal systems.

B. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Owner's representative, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner.

C. Notify the Owner's representative immediately if any settlement or movement is detected on structures. If the settlement or movement is deemed by the Owner's representative to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering plan to the Owner's representative within 24 hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.

D. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Owner's representative.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with the Contract documents.

1.06 PROJECT/SITE CONDITIONS

A. Subsurface Conditions: Refer to Geotechnical Report provided specifically for the project. The Contractor is responsible for investigating existing soil conditions as the Geotechnical Report does not assure all subsurface site conditions are represented.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide settlement markers, observation wells, piezometers and/or any other geotechnical instruments in accordance with the submitted dewatering plan.

B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.

C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.

D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.

E. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.

F. Provide and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.

G. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.

H. Provide cement grout having a water cement ratio of 1 to 1 by volume.

I. Provide for dewatering discharge sampling as required by regulatory agencies. All sampling and permit fees are to be paid by the Contractor.

J. Sampling parameters must meet regulatory standards prior to dewatering discharge. The Contractor is required to pay for all sampling and testing, including permitting efforts as necessary for dewatering discharge of groundwater.

PART 3 - EXECUTION

3.01 EXECUTION

A. Execution of any earth excavation, installing earth retention systems, and dewatering shall not commence until the related submittals have been reviewed by the Owner' representative with all Owner's representative comments satisfactorily addressed and the geotechnical instrumentation has been installed.

B. Furnish, install and maintain dewatering system in accordance with the dewatering plan and regulatory requirements.

C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.

D. Do not excavate until the dewatering system is operational.

E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below groundwater level have been completed such that they will not be floated or otherwise damaged by an increase in groundwater elevation.

F. Discontinue open pumping from sumps and ditches, if such pumping is resulting in boils, loss of fines, softening of the ground, or instability of the slopes. Modify dewatering plan and submit to the Owner's representative and required regulatory agencies at no additional cost to the Owner.

G. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials in accordance with Division 2 specifications at no cost to the Owner.

H. Dewatering Discharge:

1. Install and monitor recharge systems when specified and/or indicated and in accordance with the submitted dewatering plan.

2. Install sand and gravel filters in conjunction with well points and deep wells to prevent the migration of fines from the existing soil during the dewatering operation.

3. Transport pumped or drained water to discharge location without interference to other work, damage to pavement, other surfaces, or property.

4. Provide separately controllable pumping lines.

5. The Owner's representative reserves the right to sample discharge water at any time. The Contractor is required to meet all regulatory requirements for sampling and sampling parameters, prior to dewatering discharge.

6. Immediately notify the Owner's representative if suspected contaminated groundwater is encountered. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations.

I. Monitoring Devices and Records:

1. Install, maintain, monitor and take readings from the observation wells and geotechnical instruments in accordance with the dewatering plan.

2. Install settlement markers on structures within the zone of influence for dewatering a distance equal to twice the depth of the excavation, from the closest edge of the excavation. Conduct and report settlement surveys to 0.01 feet.

3. For large rectangular, square or circular mass excavations the zone of influence shall be defined by the actual cone of watering influence corresponding to a 10% increase in effective vertical stress.

4. Install and maintain erosion/sedimentation control devices at the point of discharge and in accordance with the dewatering plan and regulatory requirements.

J. Removal:

1. Do not remove dewatering system without written approval from the Engineer, and/or the City. Backfill and compact sumps or ditches with clean fill in accordance with Division 2 of the specifications and City requirements. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

END OF SECTION

SECTION 02160

TEMPORARY EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Design, furnish and install temporary excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, railroads and other facilities.

B. Common types of excavation support system include, but are not limited to, singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheet pile wall, timber sheet pile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.

C. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box. The Contractor shall use such means and methods as necessary to accomplish the work as shown on the plans. Sheeting, shoring, bracing and other methods necessary for the piping installation shall be provided by the Contractor at no additional cost to the City and whether shown or indicated on the plans or not.

D. Construction of the temporary excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired by the Contractor at no additional cost to the City.

E. Adjacent structures are those that bear upon soils above the proposed excavation depth and within a distance equal to twice the total depth of the excavation away from the closest edge of the excavation. Monitor and protect adjacent structures as specified and indicated.

F. Vibration monitoring for excavation support systems will be performed by Contractor's vibration consultant and monitoring firm. Vibration due to Contractor's operations shall not exceed specified limits herein.

G. Construction operations not to exceed specified noise limits in accordance with the City's Noise Ordinances.

H. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the temporary excavation support systems.

The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the City.

I. All excavation support systems are to be designed and installed in conformance with the latest OSHA requirements.

1.02 RELATED WORK

A. Divisions 2 and 3.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. A36: Standard Specification for Structural Steel.

2. A328: Standard Specification for Steel Sheet Piling.

3. A416: Standard Specification for Strand Steel, Uncoated Seven-Wire for Prestressed Concrete.

4. A722: Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete.

5. A615: Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

B. American Wood-Preserves Association (AWPA) Standards.

C. American Welding Society (AWS) Code: D1.1.

D. Federal Standard, FS TT-W-571: Wood Preservation and Treating Practices.

E. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Subpart P - Excavations, Trenching and Shoring.

F. American Concrete Institute (ACI)

1. ACI 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01340:

1. Submit the following qualifications four (4) weeks prior to the construction:

a. Qualifications of independent vibration consulting and monitoring firm as specified in Paragraph 1.05 C.

b. Qualifications of Contractor's temporary excavation support system designer as specified in Paragraph 1.05 D.

c. Qualifications of Contractor's temporary excavation support system installer as specified in Paragraph 1.05 G.

d. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.05 H, if a tieback system is utilized.

e. Qualifications of Contractor's temporary excavation support system installation supervisor as specified in Paragraph 1.05 J.

f. Qualifications of vacuum excavation subcontractor as specified in Paragraph 1.05 I, if drilled micro piles (DMPs) for utilities are utilized.

2. Submit a temporary excavation support plan stamped and signed by a Registered Professional Engineer at least two weeks prior to start of the construction. Do not submit design calculations. The review will be only for the information of the City and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum

a. Proposed temporary excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.

b. Certificate of Design: Refer to Section 01340.

c. A list of all design assumptions, including safety factors used for the temporary excavation support system(s) and all lateral pressures used for each system.

d. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.

e. Requirements of dewatering during the construction.

f. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.

g. List of equipment used for installing the

h. Excavation support systems.

i. Monitoring schedule, installation procedures and location plans for vibration/noise monitoring, geotechnical instrumentation (deformation monitoring points, inclinometers, etc.) and observation wells/piezometers to monitor ground, excavation support system, adjacent structures and groundwater fluctuation during the entire construction period.

3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain temporary excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.

4. Monitoring data within one (1) day of data collection from vibration and noise recording equipment, observation wells, and deformation monitoring points and offset lines. Data shall include:

a. Horizontal and vertical movements of geotechnical instruments and groundwater readings.

b. New movements since the initial readings of the geotechnical instruments.

c. Weekly summary in tabular and graphic form at the end of each week.

d. A schematic plan of excavation and/or relevant construction activities at the time of monitoring.

5. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:

a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.

b. Type of the temporary excavation support system.

c. Elevations (NAVD 88, or as applicable for the current survey datum) of top and bottom of the excavation support systems left in place.

1.05 QUALITY ASSURANCE

A. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.

B. Construction operations to conform to noise regulations provided in the Noise Control Plan and this Section.

C. Retain the services of an independent vibration consulting firm with the following in-house personnel to conduct the following vibration monitoring requirements:

1. Preparing, reviewing and signing of monitoring plans and daily reports, and overseeing of the monitoring and interpretation of the vibration data shall be performed by personnel with the following qualifications:

   a. Be a Florida Registered Professional Engineer.

   b. Have a minimum of five (5) years' experience in the vibration consulting field.

   c. Have successfully completed at least five (5) projects with vibration-inducing construction operations, pile driving, and noise levels equal to or more severe than those to be encountered.

2. Assist Contractor in selecting pile driving equipment which will generate the lowest vibration and noise levels.

3. Installation, monitoring and interpretation of monitoring equipment shall be performed by personnel with the following qualifications:

   a. Have at least three (3) years of experience in the operation of monitoring equipment proposed for use and interpretation of records produced by such equipment.

   b. Have installed, operated, monitored and interpreted equipment and records on at least three (3) projects with vibration-inducing construction operations, pile driving, and noise levels equal to or more severe than those to be encountered.

D. The peak particle velocity for pile driving, or other vibration-inducing operations, shall not exceed the following:

Type of Concrete	Age of Concrete, hrs	Peak Particle Velocity in/sec
Mass Concrete (footings, mats, Slab-on-grade, fill concrete, etc.)	0-11	1.0
	11 and over	2.0
Concrete Structures (walls, columns, elevated slabs, etc.)	0-11	0.5
	11-24	1.0
	24 and over	2.0
Existing Structures, residences or utilities	-	0.5

E. If utilizing deformation monitoring points (DMPs) for utilities, vacuum excavation shall be performed by subcontractor having five (5) years of experience in non-destructive vacuum excavation methods for utilities.

F. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in the state where the project is located and having the following qualifications:

1. Not less than ten (10) years' experience in the design of specific temporary excavation support systems to be used.

2. Completed not less than five (5) successful temporary excavation support system projects of equal type, size, and complexity within the last five (5) years.

G. Temporary Excavation Support System Installer's Qualifications:

1. Not less than three (3) year experience in the installation of similar types and equal complexity as the proposed system.

2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.

H. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:

1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.

3. Have not less than five (5) years of experience in testing of tieback systems of similar type and equal complexity as the proposed system.

4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.

I. Install all temporary excavation support systems under the supervision of a supervisor having the following qualifications:

1. Not less than five (5) years of experience in installation of systems of similar type and equal complexity as the proposed system.

2. Completed at least five (5) successful temporary excavation support systems of similar type and equal complexity as the proposed system.

J. All welding shall be performed in accordance with AWS D1.1.

1.06 DESIGN CRITERIA

A. Design of temporary excavation support systems shall meet the following minimum requirements:

1. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, roadways, railroads, and other surcharge loads.

2. Design a bracing system to provide sufficient reaction to maintain stability.

3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.

4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet below the bottom of the excavation.

5. Design temporary excavation support systems to withstand an additional 2 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.

1.07 DELIVERY, STORAGE AND HANDLING

A. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.

B. Steel Sheet Piling: ASTM A328, continuous interlocking type.

C. Timber Lagging Left in Place: Pressured treated per appropriate AWPA standards.

D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.

E. Raker Ties: ASTM A615 Grade 60.

F. Cement Grout Materials And Admixtures For Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.

G. Tamping tools adapted for backfilling voids after removal of the excavation support system.

H. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

2.02 EQUIPMENT

A. A vibratory hammer shall be utilized for driving the temporary sheet piling providing that such operations do not exceed vibration/noise requirements of the specifications. Impact hammer shall be utilized when vibratory hammer is unable to drive temporary sheet piling to required depth and/or unable to meet vibration requirements. Impact hammer shall also meet noise and vibration requirement.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of the temporary excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.

B. Install excavation support systems in accordance with the temporary excavation support plan.

C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer or City's representative present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the City.

D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.

E. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.

F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.

G. Install and read geotechnical instrumentation in accordance with the temporary excavation support plan. Notify the Engineer or City's representative immediately if any geotechnical instrumentation is damaged. Repair or replace damaged geotechnical instrumentation at the sole option of the Engineer and at no additional cost to the City.

H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. If the measured movements approach or exceed the allowable movements, take immediate steps to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities or other measures (Construction Contingency Plan) as required.

I. Notify the City and Engineer if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owner's permission or have the Engineer make the modifications at no additional cost to City.

3.02 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS

A. Allowable Vertical (heave/settlement) and Lateral Movements: 2 inches [5 cm] maximum for the trench box excavation support system, and 1 inch [2.5 cm] maximum for other types of excavation support systems at any location behind the excavation support system.

B. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings.

C. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.

D. Notify the Engineer when the allowable ground deformation is exceeded.

E. Implement Construction Contingency Plan under direction of the temporary excavation support system designer and the Engineer.

3.03 REMOVAL OF EARTH RETENTION SYSTEM

A. Sheeting shall not be left in place. Remove the temporary excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of temporary excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.

B. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.

C. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.

3.04 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02220

EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work included under this section consists of excavating, grading, backfilling and compacting for general construction.

B. See also Division 2 specifications.

C. Excavation shall include the removal of all material of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said material shall conform to the lines and grades indicated.

1. When excavations are to be made in paved surfaces, the pavement shall be saw-cut ahead of the excavation by means of suitable sharp tools to provide a uniform sharp edge, with minimum disturbance of remaining material. FDOT requirements shall be followed for all work within FDOT's ROW limits and for all work outside of those limits, City requirements shall be followed for pavement removal and replacement.

1.02 PROTECTION

A. Excavations

1. Notify Engineer and City of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.

2. Provide and maintain adequate barricades and warning lights to protect open trenches.

3. All trenches shall be fully backfilled at the end of each day.

4. It is not currently known if geogrid exists within the project corridor. All geogrid that is disturbed during excavations shall be removed and replaced with new geogrid, using the manufacturer's recommendations for overlap and connecting/reconnecting to existing geogrid within the project corridor. Geogrid is to comply with the specifications as provided in the Appendix. Varying locations and elevations for existing geogrid are within the project corridor. It is the Contractor's responsibility to minimize the impact to the existing geogrid during open trench installations and to provide for a like or better geogrid installation within all impacted areas.

B. Existing Utilities

1. Those existing utilities that are to be retained shall be protected, and if damaged, shall be repaired by the Contractor at no additional cost to the City.

2. The Contractor shall notify CALL SUNSHINE at 811 and/or each utility individually, forty-eight (48) hours prior to any excavation.

C. Contractor shall exercise care during excavation in areas of environmental sensitivity and advise the project engineer if any hazardous material is encountered.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Material shall comply with the latest FDOT specifications for Road and Bridge Construction, the drawings and other contract documents.

B. Material used for backfill shall be select granular material, free from grass, roots, brush or other vegetation, rubbish, clay, marl, lumps of broken paving or boulders having maximum dimension larger than six (6") inches. Unsuitable material shall be removed from the site at the Contractor's expense away from the project.

C. Material coming within one foot (1'-0") of any structure or pipe shall be free of rocks or unbroken masses of earthy material having maximum dimension larger than two inches (2").

D. If, in the Engineer's opinion, material is unsuitable for backfill purposes, imported material having sand equivalent value of no less than twenty percent (20%) shall be used for this portion of the trench backfill. Imported sand backfill, will be at the Contractor's cost.

E. Suitable For Fills: Material classified as A-1, A-3, or A-2-4 under AASHTO M 145, free from vegetation and organic material, and with not more than 10 percent by weight passing the No. 200 sieve.

F. Unsuitable for Fills: Materials classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 and A-8 under AASHTO M 145.

G. Select Material: Suitable material containing no pieces or rock fragments larger than will pass a 3-inch diameter ring.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Work shall comply with the latest FDOT Standard Specifications for Road and Bridge Construction.

B. Trench and Excavation

1. Work shall comply with the latest FDOT Standard Specifications for Road and Bridge Construction.

2. The maximum amount of open trench permitted in any one (1) location shall be one hundred feet (100'), unless the trench is located within a State or County right-of-way, in which case the requirement would defer to the more stringent of those agencies.

3. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, and only when approved by the agency having jurisdiction over the right-of-way (ROW) limits, heavy steel plate adequately braced and capable of supporting vehicular traffic may be used in certain locations where it is impractical to backfill at the end of each day.

C. Over-excavation when Necessary or Ordered:

1. Trenches shall be over-excavated beyond the depth shown, when necessary or ordered by the City or Engineer. Such over-excavation shall be to the depth ordered.

2. The trench shall be refilled to the grade of the bottom of the pipe with either selected granular material obtained from the excavation, sand or crushed rock, at the option of the City. When crushed rock bedding is ordered, the material shall be a well-graded material with maximum particle size of three-quarters of an inch (3/4").

3. Bedding material shall be placed in layers, brought to optimum moisture content, and compacted to ninety-five percent (95%) of maximum density or as required by the City's standards and specifications.

D. Over-excavation not Ordered, Specified or Shown:

1. Any over-excavation carried below the grade ordered, specified or shown, shall be refilled to the required grade with suitable selected granular material.

2. Refilled material shall be moistened as required and compacted to ninety-five percent (95%) of maximum density.

3. Work required due to over excavation when not ordered shall be performed by the Contractor at his own expense.

E. Disposal of Excess Excavated Material:

1. The Contractor shall remove and dispose of all excess excavated material at his own expense, in accordance with the General Conditions.

2. All excess suitable material that cannot be used as fill on the site(s), is to remain property of the City and shall be removed by the Contractor to a disposal site(s) as directed by Engineer.

3. All materials suitable for use as backfill shall be hauled to and used in areas where not enough suitable material is available from the excavation.

4. Unsuitable material such as trees, shrubs, etc. shall be the Contractor's responsibility to load, haul and provide a disposal site.

3.02 BACKFILLING

A. Work shall comply with the latest FDOT Specifications for Road and Bridge Construction, the drawings and all other contract documents.

B. Backfill shall not be dropped directly upon any structure or pipe.

C. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.

D. Backfill around and beneath structures, and beneath paved areas:

1. Except where otherwise specified for a particular structure or ordered by the ENGINEER, backfill placed around and beneath structures, and beneath paved areas, shall be placed in horizontal layers not to exceed eight inches (8") in thickness, as measured before compaction.

2. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to ninety-five percent (98%) of maximum density.

3.03 COMPACTION TESTING

A. Compaction testing specified herein are expressed as a percentage of maximum density. Maximum density shall be determined by AASHTO T-180, Method D.

B. The Contractor shall retain the services of an independent materials testing laboratory to perform laboratory and field density tests which are necessary to establish compliance with the compaction requirements of these specifications. The tests will be paid for by the Contractor. Lack of coordination or delay time will not be compensated for by the City. Multiple tests which are not coordinated, or which do not meet City standards, will not be paid for by the Owner and are at the sole cost of the Contractor.

C. The costs of subsequent recompaction and retesting due to not achieving the required minimum compaction shall be borne by the Contractor at no additional cost to the City.

D. Compaction density tests shall be scheduled by the Contractor who shall give notice to the City at least 24 hours in advance of required density tests.

E. All tests which fail to meet minimum compaction requirements shall be paid by the Contractor. All tests shall be performed in the presence of the City or their representative.

F. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured, at no additional cost to the City.

END OF SECTION

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SECTION 02222

EXCAVATION AND BACKFILL FOR UTILITIES AND STRUCTURES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Excavate, grade and backfill as required for underground piping systems and structures including appurtenances as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01340 – Shop Drawings

B. Divisions 2 and 3.

1.03 QUALITY CONTROL

A. Codes and Standards: Excavation and backfill work shall be performed in compliance with applicable codes, standards and requirements of governing authorities having jurisdiction in the area.

B. Testing and Inspection Service: The contractor shall retain the services of an independent testing laboratory to do appropriate testing as described in Section 01400, Testing and Inspection. The Contractor shall schedule its work so as to permit a reasonable time for testing before placing succeeding lifts and shall keep the laboratory informed of his progress. A minimum of 48 hours of notice shall be provided to the testing laboratory to mobilize its activities.

1.04 SUBMITTALS

A. General: Submit information and samples to the Engineer for review as specified herein in accordance with Section 01340 - Shop Drawings.

B. Dewatering: See Section 02140 for Dewatering. If the quantity or nature of water withdrawn requires approval/permits from regulatory agencies, the Contractor shall procure such permits at its expense and submit copies to the Engineer and Owner before commencing the work. Only City permit fees will be paid for by the City. The Contractor will not be granted contract time extensions due to dewatering permit processing delays or sampling requirements.

C. Bedding and Backfill Materials: The Contractor shall notify the Engineer of the off-site sources of bedding and backfill materials, and submit to the Engineer a representative sample weighing approximately 50 lbs. The sample shall be delivered to a location on site determined by the Engineer.

D. Sheeting System: Drawings of the sheeting system and design computations shall be submitted to the Engineer; however, the review of these drawings shall in no way relieve the Contractor of the responsibility to provide a safe and satisfactory sheeting and shoring system. Sheeting and shoring shall be designed by the Contractor, and the proposed design shall be sealed by a Professional Engineer registered in the State of Florida. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, it may order additional supports put in at the Contractor's expense.

1.05 SUBSURFACE INFORMATION

A. The Contractor shall be responsible for anticipating groundwater and understanding soil conditions and shall provide positive control measures as required. Such measures shall ensure stability of excavations, groundwater pressure control, prevention of tanks, pipes, and other structures from being lifted by hydrostatic pressures, and avoiding the disturbance of subgrade bearing materials.

1.06 TRENCH SAFETY ACT COMPLIANCE

A. The Contractor by signing and executing the contract is, in writing, assuring that it will perform any trench excavation in accordance with the Florida Trench Safety Act. The Contractor has further identified the separate item(s) of cost of compliance with the applicable trench safety standards as well as the method of compliance as noted in the "Bid Forms" Section of the Contract front-end documents.

B. The Contractor acknowledges that this cost is included in the applicable items of the Proposal and Contract and in the Grand Total Bid and Contract Price.

C. The Contractor is, and the City and Engineer are not, responsible to review or assess the Contractor's safety precautions, programs or costs, or the means, methods, techniques or technique adequacy, reasonableness of cost, sequences or procedures of any safety precaution, program or cost, including but not limited to, compliance with any and all requirements of the Trench Safety Act. The Contractor is, and the City and Engineer are not, responsible to determine if any safety or safety related standards apply to the project, including but not limited to, the Trench Safety Act.

1.07 PROTECTION OF PROPERTY AND STRUCTURES

A. The Contractor shall, at its own expense, sustain in place and protect from direct or indirect injury, all pipes, poles, conduits, walls, buildings, and all other structures, utilities, and property in the vicinity of its Work. Such sustaining shall be done by the Contractor. The Contractor shall take all risks attending the presence or proximity of pipes, poles, conduits, walls, buildings, and all other structures, utilities, and its Work. It shall be responsible for all damage, and assume all expenses, for direct or indirect injury and damage, caused by its Work, to any such pipe, structures, etc., or to any person or property, by reason of injury to them, whether or not such structures, etc., are shown on the Drawings.

B. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations.

Barricades with flashing lights shall also be placed along excavation from sunset each day to sunrise of the next day until such excavation is entirely refilled, compacted, and paved. All excavations shall be barricaded where required to meet OSHA, local and Federal Code requirements, in such a manner to prevent persons from falling or walking into any excavation within the site fenced property limits.

1.08 EXISTING UTILITIES

A. Locate existing underground utilities in the areas of work. Test pits and hand excavation in critical areas will be required prior to initiating work. Identify potential conflicts ahead of construction.

B. The Contractor shall coordinate relocation of utilities with utility companies having jurisdiction in the area. Should unknown or incorrectly identified piping or other utilities be encountered during excavation, the Contractor shall consult the City, Engineer and Owner of such piping/utility for directions.

C. The Contractor shall cooperate with the City and utility companies in keeping respective services and facilities in operation and support and protect all existing utilities at all times.

PART 2 - PRODUCTS

2.01 BEDDING MATERIAL

A. All materials are to comply with the latest FDOT standards and specifications.

B. Bedding materials shall be furnished from acceptable off-site sources. The Contractor shall submit to the Engineer the sources of each material for review in accordance with Section 01340.

C. Crushed stone (or drainfield limerock) shall be used as bedding material for piping (except for copper pipe) and/or manholes as shown on the Standard Details when the installation is below the ground water table elevation. Crushed stone shall consist of hard, durable, sub-angular particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines, and other deleterious materials.

1. For pipe diameters less than 24 inches, the stone shall conform to the requirements of ASTM C 33, Size No. 57 (3/4-inch rock) and be graded within the following limits:

Sieve Size	Percent Finer by Weight
1-½ inch	100
1 inch	95 - 100
½ inch	25 - 60
No. 4	0 - 10
No. 8	0 – 5

2. For bedding of 24 inch and larger diameter pipe, the stone shall conform to the requirements of ASTM C 33 and be graded within the following limits:

Sieve Size	Percent Finer by Weight
5/8 inch	100
1/2 inch	40 – 100
3/8 inch	15 - 45
No. 10	0 – 5

D. Sand shall be used for bedding pipe when installed under dry trench conditions, or above the ground water table. Sand shall also be used for bedding copper pipe under all conditions. Sand shall be dry, screened, graded sand with 100 percent passing a 3/8-inch sieve and not more than 5 percent passing a No. 200 sieve.

E. Limerock screenings, sand or other fine material shall not be used for bedding.

F. All pipe bedding material shall be new, unless otherwise approved by the Engineer. Existing pipe bedding material may not be used.

G. Suitable For Fills: Material classified as A-1, A-3, or A-2-4 under AASHTO M 145, free from vegetation and organic material, and with not more than 10 percent by weight passing the No. 200 sieve.

H. Unsuitable for Fills: Materials classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 and A-8 under AASHTO M 145.

I. Select Material: Suitable material containing no pieces or rock fragments larger than will pass a 3-inch diameter ring.

2.02 SELECT BACKFILL

A. Select Backfill: Select backfill shall be clean sandy material passing through a 3/4-inch sieve as select backfill material.

2.03 GENERAL BACKFILL

A. All other backfill (general backfill) placed above the select backfill shall pass through a 6-inch ring. General backfill shall contain no more than 10 percent organics. General backfill used under roadways shall be compatible with the materials and compaction specified in FDOT standards and specifications.

2.04 STRUCTURAL BACKFILL

A. Fill material shall be non-cohesive, non-plastic, granular mixture of local clean sand or local clean sand and limerock free from vegetation, organic material, muck or deleterious matter. Material shall conform to AASHO-2 gradation with no more than ten (10) percent by weight passing the No. 200 sieve. All rock or hard material shall pass through a 3-inch diameter ring. Broken Portland cement or asphaltic concrete shall not be considered an acceptable fill material. Fill material containing limerock shall have sufficient sand to fill the voids in the limerock. Material placed in the upper 6-inches of all backfills or fills shall not contain any

stones or rocks larger than 1-inch in diameter. Limits of excavation and fill shall be as defined on the Drawings. All structural fill materials shall be obtained from off-site sources.

2.05 EXCAVATABLE FLOWABLE FILL

Excavatable flowable fill is called for on the Drawings or required where limited cover over the existing piping may exist due to conflicts with existing utilities or areas where it is not deemed feasible to go under the existing utility piping. Excavatable flowable fill will be required whenever the piping does not meet a minimum of 3 feet of cover, whether shown on the Drawings, or not shown on the drawings. The excavatable flowable fill shall be used in these instances for backfill and shall be placed around the piping conflict such that a layer is formed surrounding both the existing and the proposed or "new" piping with a minimum distance of 3 feet outside of the outer diameters of the intersecting piping and to finished grade elevation. Flowable fill contains a low cementitous content to reduce strength developments for possible future removal. Compressive strength testing shall be governed by the guidelines set forth in ACI Committee Report 229 and shall meet FDOT Standards and Specifications.

2.06 PAVEMENT RESTORATION AND GEOGRID REQUIREMENTS

FDOT standards and specifications shall be followed for all pavement and restoration work within their right-of-way limits. City standards are to be followed for all pavement removal and replacement and restoration work outside of FDOT ROW limits. Pavement shall be required to be matched in kind and to the same thicknesses of existing pavement. The Contractor shall perform any pavement corings or other due diligence to assess pavement thicknesses for restoration. In addition, there is existing geogrid within the project corridor. Removal and replacement of the existing geogrid will be required, with providing for the manufacturer's recommendations for removal and replacement including any necessary overlap of the geogrid, and all connections/reconnections to existing geogrid, at all locations and elevations where existing geogrid is encountered.

PART 3 - EXECUTION

3.01 EXCAVATION

The maximum amount of open trench permitted in any one (1) location shall be one hundred feet (100'), unless the trench is located within a State or County right-of-way, in which case the requirement would defer to the more stringent of those agencies.

A. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected. Notify the City and Engineer of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.

B. Examine and accept existing grade of the project site walkways, pavements, etc., prior to commencement of work and report to Engineer if elevations of existing subgrade substantially vary from elevations shown on the Drawings.

C. The Contractor shall perform all excavation of every description and of whatever substance encountered, to the dimensions, grades and depths shown on the Drawings, or as required for a proper installation. All excavations shall be made by open cut and in accordance with the Trench Safety Act. All existing utilities such as pipes, poles and structures shall be carefully located, supported and protected from injury; in case of damage, they shall be restored at the Contractor's expense.

1. When excavations are to be made in paved surfaces, the pavement shall be saw-cut ahead of the excavation by means of a suitable sharp tools to provide a uniform sharp edge, with minimum disturbance of remaining material.

D. Pipe trenches for piping shall be excavated to a width within the limits of the top of the pipe and the trench bottom so as to provide a clearance on each side of the pipe barrel, measured to the face of the excavation, or sheeting if used, of 8 inches to 18 inches as defined on the Drawings. Where the pipe size exceeds 12 inches, the clearance shall be from 12 inches-to-18 inches. All pipe trenches shall be excavated to a level where suitable material is reached, a minimum of 8 inches below the pipe barrel or that will allow for a minimum of 36 inches of covering unless otherwise indicated on the Drawings.

E. Ladders or steps shall be provided for and used by workmen to enter and leave trenches as per OSHA standards.

F. Excavated unsuitable material shall be removed from the site and disposed of by the Contractor. Materials removed from the trenches shall be stored and in such a manner that will not interfere unduly with traffic on public roadways and sidewalks and shall not be placed on private property. In congested areas, such materials that cannot be stored adjacent to the trench or used immediately as backfill shall be removed to other convenient places of storage acceptable to the City at the Contractor's expense.

G. Excavated material that is suitable for use as backfill shall be used in areas where sufficient material is not available from the excavation. Suitable material in excess of backfill requirements shall be disposed off-site at the Contractor's expense and with no additional cost to the Owner.

H. Unless otherwise indicated on the Drawings, all excavation for structures shall be made in such a manner, and to such widths, as will give ample room for properly constructing and inspecting the structures they are to contain. Excavation shall be made in accordance with the details shown on the Drawings, and as specified herein. Attention shall be given to the proper handling of storm water runoff. The Contractor shall intercept and collect surface run off both at the top and bottom of cut slopes. The excavating equipment shall operate in an organized fashion so as to remove silt from one edge of the excavation to the other so as not to trap silt within the undercut area.

I. Over-excavation When Ordered:

1. Trenches shall be over-excavated beyond the depth shown, when ordered by the City or Engineer. Such over-excavation shall be to the depth ordered.

2. The trench shall be refilled to the grade of the bottom of the pipe with either selected granular material obtained from the excavation, sand or crushed rock, at the option of the City or Engineer. When crushed rock bedding is ordered, the material shall be a well-graded material with maximum particle size of three-quarters of an inch (3/4").

3. Bedding material shall be placed in layers, brought to optimum moisture content, and compacted to ninety-eight percent (98%) of maximum density.

J. Over Excavation not Ordered, Specified or Shown:

1. Any over-excavation carried below the grade ordered, specified or shown, shall be refilled to the required grade with suitable selected granular material.

2. Refilled material shall be moistened as required and compacted to ninety-eight percent (98%) of maximum density.

3. Work required due to over excavation when not ordered shall be performed by the Contractor at his own expense.

3.02 UNAUTHORIZED EXCAVATION

A. Excavation work carried outside of the work limits required by the Contract Documents shall be at the Contractor's expense, and shall be backfilled by the Contractor at its own expense with structural fill, as directed by the Engineer. Where, in the judgment of the Engineer, such over-excavation requires use of lean concrete or crushed stone, the Contractor, at its expense, shall furnish and place such materials.

3.03 SHEETING AND BRACING

A. See Section 02160 Temporary Excavation and Support Systems

B. If the Engineer is of the opinion that at any point sufficient or proper supports, have not be provided, he may order additional supports put in at the Contractor’s expense. The Contractor shall be responsible for the adequacy of all sheeting used and for all damage resulting from sheeting and bracing failure or from placing, maintaining and removing it.

3.04 REMOVAL OF WATER

A. General: It is a basic requirement of these Specifications that excavations shall be free from water before pipe or structures are installed. Removal of groundwater, or dewatering, shall be accomplished in accordance with the requirements of Section 02140, Dewatering.

3.05 TRENCH STABILIZATION

A. No claim for extras, or additional payment will be considered for cost incurred in the stabilization of trench bottoms which are rendered soft or unstable as a result of construction methods, such as improper or inadequate sheeting, dewatering or other causes. In no event shall pipe be installed when such conditions exist and the Contractor shall correct such conditions so as to provide proper bedding or foundations for the proposed installation at no additional cost to the City before placing the pipe or structures.

3.06 PIPE BEDDING IN DRY TRENCHES

A. Pipe trenches shall be excavated as described herein. The resulting excavation shall be backfilled with acceptable pipe bedding material, up to the level of the centerline of the proposed pipe barrel. This backfill shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

B. Any over excavation below the levels required for installation of the pipe shall be backfilled with acceptable bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe, at the Contractor's expense.

3.07 BACKFILL

A. The Contractor shall not backfill trenches until the piping has been inspected and tested in accordance with Section 15995, Pipeline Testing and Disinfection.

B. Pipelines: Pipeline trenches shall be backfilled to a level 12 inches above the top of the pipe with select backfill. When placed in the dry, such material shall be placed in 8-inch layers, each compacted to the densities specified herein. Only hand operated mechanical compacting equipment shall be used within six inches of the installed pipe.

C. After the select backfill has been placed as specified above, and after all excess water has completely drained from the trench, general backfilling of the remainder of the trench may proceed. General backfill shall be placed in horizontal layers, the depth of which shall not exceed the ability of the compaction equipment employed, and in no event shall exceed a depth of 12 inches. Each layer shall be moistened, tamped, puddled, rolled or compacted to the densities specified herein.

D. Manholes and Vaults: Any excavation below the levels required for the proper construction of manholes or vaults shall be filled with Class B concrete. The use of earth, rock, sand or other materials for this purpose will not be permitted.

3.08 COMPACTION AND DENSITIES

A. Compaction of backfill shall be 98 percent of the maximum density where the trench is located under structures or paved areas, and 95 percent of the maximum density elsewhere. Methods of control and testing of backfill construction are:

1. Maximum density of the material in trenches shall be determined by ASTM D 1557.

2. Field density of the backfill material in place shall be determined by ASTM D 1556 or D 2922.

B. Density Test Locations for Pipelines: The compacted backfill/fill shall be tested for in-place density at the rate of one test location per 200 lineal feet (or fraction thereof) of trench, or as shown on the Drawings or as directed by the Engineer. The density tests shall be taken at the trench bottom and at each location in one foot intervals beginning from the top of the piping and ending at the final grade. At existing road or pavement crossings, a minimum of two (2) density tests per crossing per lift is required or as per FDOT standards and specifications require.

C. Inspection and Testing: As a minimum, an in-place density test will be made in each lift of compacted soil for every 2,500 square feet of area. The Contractor shall coordinate and cooperate with the testing laboratory and pay for all testing and any re-testing that is required due to insufficient densities. Additional time for lack of coordination with the testing company will not be compensated for under any circumstances.

D. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured, at no additional cost to the City. The costs for retesting such Work shall be paid for by the Contractor.

3.09 ADDITIONAL EXCAVATION AND BACKFILL

A. Where organic material, such as roots, muck, or other vegetable matter, or other material which, in the opinion of the Engineer, will result in unsatisfactory foundation conditions, is encountered below the level of the proposed pipe bedding material, it shall be removed to a depth of two feet below the outside bottom of the pipe or to a greater depths as directed by the Engineer and removed from the site. Sheeting shall be installed if necessary to maintain pipe trenches within the limits identified by the Engineer. The resulting excavation shall be backfilled with suitable backfill material, placed in 12-inch layers, tamped and compacted up to the level of the bottom of the proposed pipe bedding material. Sufficient compaction of this material shall be performed to protect the proposed pipe against settlement. Lean concrete may be used in lieu of backfill when pipe installation is in the wet or at the Contractor’s option. Construction shall then proceed in accordance with the provisions herein.

B. Additional excavation (more than two feet below the pipe) shall be performed when ordered by the Engineer. Where organic or other material is encountered in the excavation, the Contractor shall bring the condition to the attention of the Engineer and obtain his determination as to whether or not the material will require removal, prior to preparing the pipe bedding. In areas where muck is located, the excavation of material up to two feet below the outside bottom of the trench width will be required to be removed and disposed of by the Contractor.

The removal and disposal of up to two feet of muck below the pipe trench is considered incidental to the construction and the Work shall be done at no additional cost to the City which also includes replacing the muck with suitable pipe bedding material.

3.10 GEOGRID REMOVAL AND REPLACEMENT

A. It is not currently known if geogrid exists within the project corridor. Manufacturer's recommendations are to be followed for all geogrid removal, replacement, restoration, overlap and connections/reconnections to existing geogrid. Geogrid(s) within the project limits may be at varying elevations, locations, and require manufacturer's recommendations and input for necessary restoration requirements. The Contractor is required to remove and replace all geogrid within the open cut limits and protect the existing geogrid to the greatest extent possible adjacent to the open cut limits. Replacement of the geogrid, or geogrids within the corridor, meeting all manufacturer's recommendations and with any necessary coordination to ensure that the geogrid is properly replaced and restored are the responsibility of the Contractor, at no additional cost to the City.

3.11 DISPOSAL

A. The Contractor shall remove and dispose of all excess excavated material at his own expense. All excess suitable material that cannot be used as fill on the site(s) is to remain the property of the City and shall be removed by the Contractor to a disposal site(s) as directed by the City or Engineer. All materials suitable for use as backfill shall be hauled to and used in areas where not enough suitable material is available from the excavations. All unsuitable material such as trees, shrubs, etc., shall be the Contractor's responsibility to load, haul and provide a disposal site and their cost.

3.12 RESTORATION

A. Provide finished grading in accordance with Section 02260, Finish Grading. Restore all green space areas disturbed by the trenching operations in accordance with Section 02500, Landscaping, and Section 02930, Sodding or as otherwise applicable.

END OF SECTION

SECTION 02225

CONTAMINATED SOILS AND GROUNDWATER

PART 1 - GENERAL

1.01 THE REQUIREMENTS

A. This Section includes, except as elsewhere provided, the work necessary to remove, transport, and properly dispose of contaminated soils and groundwater required for complete construction of structures and underground piping systems and appurtenances as shown on the Drawings and specified herein.

B. The Contractor is to review the County contaminated sites listing and to obtain the most current listing from the County's records, website, or other environmental departments for reference of locations which may potentially have contaminated groundwater and soils. Contaminated sites and the potential of contaminated groundwater and soils shall be the sole responsibility of the Contractor to identify and to follow regulatory requirements for all work within these areas.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 2.

1.03 QUALITY CONTROL

A. Codes and Standards: All work associated with dewatering, excavation, removal, transportation and disposal of contaminated soils and groundwater shall be performed in compliance with applicable codes, standards and requirements of governing authorities having jurisdiction in the area.

B. Testing and Inspection Service: A testing laboratory certified by the agency having jurisdiction over the ROW limits, approved by the City and the State of Florida, shall be retained by the Contractor to conduct appropriate soils and groundwater testing in accordance with regulatory requirements and the Contract Documents.

1.04 SUBMITTALS

A. The Contractor shall submit information and samples to the City for review as specified herein in accordance with Section 01340. The information shall include:

1. Detailed description of the proposed methods for temporary stockpiling, transportation, and disposal of all contaminated soils and groundwater.
2. Copies of permits for all disposal facilities.
3. Copies of all manifest and documentation for handling and disposing of all contaminated soil and groundwater in full compliance with local, state and

federal requirements. This documentation must be provided prior to requesting payment under this Bid item.

4. Copies of all laboratory analyses required for transportation and disposal of all contaminated soils and groundwater in full compliance with local, state and federal requirements.

5. Names, addresses and contact numbers of all subcontractors.

6. Copy of Contractor's Health and Safety Plan and training certificates of personnel who will be handling the contaminated material in accordance with OSHA requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTAMINATED SOILS

A. The Contractor shall retain a laboratory certified by the County and the State of Florida to sample the groundwater in the excavation, the stored soil and soil samples in the perimeter of the excavated hole for petroleum contamination and all State and Federal regulatory requirements. The number of samples shall be sufficient to comply with the requirements of the Contractor's approved Dewatering Plan and all local, state and federal regulations. The results of the tests shall be forwarded to the City.

B. Excavated materials which are deemed to be contaminated shall be removed, treated and disposed of by the Contractor in accordance with all applicable regulatory requirements. The soil may be contaminated with petroleum product which may be partly or entirely diesel fuel or gasoline. When such soil conditions are encountered, they shall be brought to the City's attention. The extent of excavation shall be determined in the field by the City.

C. All contaminated soil which is excavated shall be stockpiled in an area designated for contaminated soils. The Contractor shall take whatever precautions are necessary to ensure that contaminated soils are not co-mingled with non-contaminated stockpiled soils and/or mucks.

D. Contaminated soils must be placed on an impermeable barrier when temporarily stockpiled and must be covered with visquine to prevent runoff. All stockpile leachate or runoff must be collected for disposal in accordance with federal, state and local regulations.

E. Contaminated soils shall be processed and treated at a state licensed facility. These soils shall be transported and disposed of in accordance with federal, state and local regulations.

F. The Contractor shall be responsible for testing soil which has been treated to certify treated soil meets applicable federal, state, and local regulations for final disposal.

3.02 CONTAMINATED GROUNDWATER

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 in accordance with local, state and federal regulations and the requirements of the Contract Documents. If groundwater contamination is identified at any time during the performance of the Work, Contractor shall immediately notify the City.

B. If contaminated groundwater in the dewatering excavation area is encountered, the contaminated groundwater shall be removed, treated and discharged by the Contractor in accordance with all applicable regulatory requirements.

C. Treatment of contaminated groundwater will include the following options, depending on the magnitude of the contamination in the trench: Granular Activated Carbon (GAC) Treatment vessels, mobile air stripping units, vacuum truck removal and disposal or other method as approved by the City and regulatory agencies with jurisdiction.

D. If contaminated groundwater is encountered during construction, Contractor shall provide reference information for the qualified groundwater remediation subcontractor to be utilized, including phone number, contact name, and address. The selected groundwater treatment/recycling facility for hauling contaminated groundwater shall also be identified.

E. Effluent water from the treatment system will be analyzed by the certified laboratory to confirm that concentrations are below regulatory limits. Effluent water will then be directed to a pre-approved location as determined by local regulatory agencies and/or the City.

3.03 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 Regulations, and U.S. Department of Transportation Regulations. The Contractor shall use only transporters that are licensed and competent to haul these wastes.

3.04 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 City two 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.

3.05 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 City and shall immediately notify the City 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 City. 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 City by the designated treatment or disposal facility within 14 days of receipt of the material to be disposed.

END OF SECTION

SECTION 02260

FINISH GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall, under this Section, supply, place, compact and roll finish grade materials prior to landscaping work.

B. Finish grade sub-soil.

C. Cut out areas to receive stabilizing base course materials for paving and sidewalks.

D. Place, finish grade and compact topsoil.

1.02 PROTECTION

A. The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement, utility lines, and sprinkler system. Correct and restore any damaged items at no cost to the City.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil shall be friable loam free from subsoil, roots, grass, excessive amount of weeds, stones and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter.

2.02 CRUSHED STONE

A. Crushed stone for general grading purposes shall be hard, durable, subangular particles of proper size and gradation, and shall be free from organic materials, wood, trash, sand, loam, chalk, excess fines and other deleterious materials. Maximum aggregate size shall be ¾ inches.

PART 3 - EXECUTION

3.01 SUBSOIL PREPARATION

A. Rough grade subsoil systematically to allow for a maximum amount of natural settlement and compaction.

Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc., in excess of 2 inches in size. Remove sub-soil which has been contaminated with petroleum products.

B. Cut out areas, to subgrade elevation, which are to receive stabilizing base for paving and sidewalks.

C. Bring subsoil to required levels, profiles and contours. Make changes in grade gradual. Blend slopes in to level areas.

D. Slope grade away from building minimum 4 inches in 10 feet (unless indicated otherwise on Drawings).

3.02 PLACING TOPSOIL

A. Place topsoil in area where seeding, sodding and planting is to be performed. Place to the following minimum depths, up to finished grade elevations:

1. 6-inches for seeded areas.

2. 4 1/2-inches for sodded areas.

3. 24-inches for shrub beds.

4. 18-inches for flower beds.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of subgrade.

D. Remove stones, roots, grass, weeds, debris and other foreign material while spreading.

E. Manually spread topsoil around trees, plants, buildings and other structures to prevent damage which may be caused by grading equipment.

F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

A. Remove surplus sub-soil and topsoil from site.

B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping and or sodding.

END OF SECTION

SECTION 02315

TRENCHING AND BACKFILLING "IN THE WET"

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of excavating, backfilling and compaction as required for the construction of the piping systems as specified herein.

B. All excavations shall be executed in accordance with the South Florida Building Codes, the State of Florida Trench Safety Act (TSA), OSHA requirements and notification of Sunshine State One-Call Center (811), 48 hours prior to any excavation.

PART 2 - PRODUCTS

2.01 BACKFILL MATERIALS

A. Except where a 1:10 cement/sand or flowable fill concrete mix is required, granular soil backfill materials shall be utilized. Suitable backfill material shall be clean, shall not be expansive nor have high organic content, shall be free of clay, marl, unstable materials, debris, lumps and clods, and shall meet the following requirements:

1. Maximum Liquid Limit shall not exceed 12 as determined by ASTM D 423.

2. Maximum Plasticity Index shall not exceed 35 as determined by ASTM D 424.

3. Not more than 10 percent of weight shall be finer than 74 micron (No. 200) U.S. Standard Sieve.

B. Backfill material containing limerock shall have sufficient sand to fill the voids in the limerock. No stones or rocks larger than 6-inches in diameter will be permitted in any backfill. Backfill material placed to a point at least one foot (1 ft.) above pipe and appurtenances shall be select backfill material not exceeding 2-inches in diameter. For PVC gravity sewers backfill material placed at least two feet (2 ft.) above pipe shall be select backfill material not exceeding 2-inches in diameter. In any case, above this point, but up to the upper 6-inches of the trench, backfill shall be of material not exceeding 6-inches in diameter.

C. Debris, broken paving or broken concrete shall not be used.

D. Material for backfill may be material resulting from excavation, only if it meets the above mentioned requirements, or if suitable in the opinion of the City.

If sufficient suitable backfill material, including select backfill material, is not available from the site, additional material shall be furnished.

2.02 SELECT BACKFILL MATERIAL

Select backfill material specified in these specifications or required by the Plans shall meet all the general requirements for backfill material set forth above, and in addition, shall be free of any rocks or stones larger than 2 inches in diameter. Select backfill for copper tubing shall be limerock screenings or sand. Select backfill material may be material resulting from excavation, if suitable in the opinion of the City, carefully selected to comply with these requirements.

2.03 BEDDING MATERIAL

Pipe bedding material shall consist of one of the following types of material, and accordance with the City's Standard Details:

A. Bedding may be select backfill material, as specified above, if approved by the City.

B. Crushed stone (or drainfield limerock) shall be used for bedding of piping (except for copper pipe) and/or manholes as shown on the Standard Details. Crushed stone shall consist of hard, durable, sub-angular particles of proper size and gradation, and shall be free from organic material, wood, trash, sand, loam, clay, excess fines and other deleterious materials. The stone shall conform to the requirements of ASTM C 33, Size No. 57 (3/4-inch rock) and be graded within the following limits:

Sieve Size	Percent Finer by Weight
1 ½-inch	100
1-inch	95 to 100
½-inch	25 to 60
No. 4	0 to 10
No. 8	0 to 5

C. Sand for bedding copper pipe shall be a dry screened sand. Sand shall be graded sand with 100 percent passing a 3/8-inch sieve and not more than 5 percent passing a No. 200 sieve.

D. Limerock screenings, sand or other fine material shall not be used for bedding.

E. All pipe bedding material shall be new, unless otherwise approved by the City. Existing pipe bedding material may not be used.

2.04 BACKFILL UNDER MANHOLES AND METER VAULTS

Any excavation below the levels required for the proper construction of manholes or meter vaults shall be filled with Class C concrete.
The use of earth, rock, sand or other materials for this purpose will not be permitted.

PART 3 – EXECUTION

3.01 CLEARING

A. The Contractor shall perform all clearing necessary for the proper installation of all piping and appurtenances in the locations shown in the Drawings, in accordance with Division 2 specifications.

B. Where required, all existing shrubbery, trees, grass, sprinklers, fences, signs, mail boxes, structures, sidewalks, curbs, utility poles or structures subject to damage resulting from the excavation should be transplanted, relocated, braced, shored, or otherwise protected and preserved.

3.02 EXCAVATION

A. The Contractor shall perform all excavation of every description and of whatever substances encountered, to the dimensions and depth shown on the Drawings. All excavations shall be made by open cut.

B. When the walls of the excavations are to be kept vertical and in order to protect the safety of workmen, the general public, this or other work or structures, or excavation walls, or pipe installation including materials encountered in the excavation which have a tendency to slough or flow into the excavation, undermine the banks, weaken the overlying strata, or are otherwise rendered unstable by the excavation operation shall be retained by steel sheeting, stabilization, grouting or approved methods. Said methods shall comply with the Trench Safety Act (TSA). Sheeting and shoring or other approved method shall be designed by a Professional Engineer licensed to practice in the State of Florida.

C. In areas where trench widths are not limited by right-of-way or easement widths, property line restrictions, existing adjacent improvements including pavements, structures, and other utilities, and maintenance of traffic, the trench sides may be sloped to a suitable angle of repose of the excavated material, but only from a point one foot above the crown of the pipe.

D. A substantially and safely constructed moveable shield or box, as approved by the Engineer of Record, may be used in place of sheeting, except where specifically called for on the Plans to install sheeting. Where a moveable shield or trench box, is used in place of sheeting and shoring, the trench shall be opened immediately ahead of the shield as pipe laying proceeds inside the shield.

E. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.

F. Materials removed from the trenches shall be stored and disposed of in such a manner that they will not interfere unduly with traffic on public streets and sidewalks. In congested areas, such materials, cannot be stored adjacent to the trench nor used immediately as backfill, shall be removed to convenient places of storage. If any material is creating a public hazard or other unsafe condition, it shall be removed immediately to a storage area.

G. Materials suitable for use as backfill be hauled to and used in areas where not enough suitable material is available from the excavation. Material unsuitable for use in backfill shall be removed promptly and disposed of by the Contractor

H. Excavation for Pipes and Piping Appurtenances:

1. Clear, as stated above, all existing items or structures in the way of the proposed pipeline or structures and excavate as necessary to the lines and grades shown on the Plans.

2. Where pavements or sidewalks are cut they shall be cut by means of a mechanical pavement saw to form true and straight edges which shall in general be either parallel or at right angles with the centerline of the pipe.

3. In order to protect himself from being held liable for any existing damaged pavement, including detour routes, the Contractor is advised to notify in writing the authority having jurisdiction over the street where such defective pavement exists prior to proceeding with any work in the vicinity. A copy of all such notices shall be forwarded to the City.

4. Excavate pipe trenches to a minimum of 6-inches below the outside bottom of the proposed pipe barrel to provide for the installation of the bedding material.

5. If, in the opinion of the City, the soil at that depth is unsatisfactory as foundation material because it contains unsuitable marl, muck, organic matter, or other unsuitable material, the excavation shall be continued 2 feet deeper, except if a suitable foundation material is exposed at a lesser depth, further excavation will not be required.

6. If the soil is still unsuitable after the additional excavation as prescribed above, the trench bottom shall be excavated further in one foot increments in accordance with "Trench Overcut", below.

7. Sheeting and shoring shall be installed where necessary to control trench width, protect the workmen and the general public, and prevent damage to this or adjacent work, or structures.

8. Where wood sheeting or certain designs of steel sheeting are used, the City may require the sheeting to be cut off at a level 2-feet above the top of the installed pipe and that portion below that level shall be left in place.

9. If interlocking steel sheeting is used, the City may permit its complete removal in lieu of cut-off, providing removal can be accomplished without disturbing the bedding, pipe or alignment of the pipe. Any damage to the pipe bedding, pipe or alignment of the constructed utility caused by removal of sheeting shall be cause for rejection of the affected portion of the work. Not more than 100-feet of trench shall be opened ahead of pipe laying operations at one time unless a greater length of open trench is approved by the City.

10. Trench widths, when measured at a point 12 inches above the top of the pipe, shall provide a 12-inch maximum clearance on each side, between the outside of the pipe barrel and the face of the excavation, or sheeting if used. Minimum trench width shall provide at least 6-inches clearance on each side, between the outside of the pipe barrel and the face of the excavation, or sheeting if used.

11. Excavation for appurtenances, such as manholes and valves, shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation or sheeting, if used, of not less than 12-inches. Manhole excavations shall be carried to sufficient depth to permit their construction on the undisturbed bottom of the excavation.

12. Excavation for thrust block shall be made in such a manner so that, when concrete is placed, it will bear against a firm, undisturbed, vertical trench wall with bearing are in accordance with the schedule shown in the Standard Details.

13. Selected backfill shall then be placed and compacted in 6-inch layers up to the level of the pipe bedding material.

14. When the pipe to be installed in a trench requires the pipe installers to work under and around the pipe, the Contractor may request the City that he be allowed to exceed the 12" maximum clearance, specifying the clear distance desired. The decision of the City in this regard shall be final.

15. The ends of existing mains shall be temporarily capped or plugged to keep them clean and the ends of all mains shall be temporarily anchored to keep the joints from blowing apart from internal pressure until the new mains can be reconnected to them.

16. In addition to specific construction methods specified, the general requirements in subsequent subsections, below, shall apply to the work of this project.

I. Excavation for PVC Gravity Sewers and Service Laterals:

1. The Contractor shall make all excavations necessary for the construction of the gravity sewers and service laterals to the lines and grades shown on the Plans, and in accordance with the Standard Details.

2. In stable soils, trench widths when measured to a point 12 inches above the top of the pipe shall provide a 12-inch maximum clearance on each side, between the outside of the pipe barrel and the face of the excavation, or sheeting if used.

Minimum trench widths under the same conditions shall be 6-inches on each side for the pipe for 4-inch and 6- inch pipe, and 9-inches on each side of the pipe for 8-inch pipe and larger. Minimum trench widths are required to provide room for a man to place and compact the haunching and initial backfill material. Embedment material shall be Class I.

3. In unstable soils (defined as peat, much or other organic soils, elastic silts and clays below the water table, and fine sands below the water level), trench widths when measured at a point 12-inches above the top of the pipe shall be a minimum of five (5) nominal pipe diameter in width. Slightly greater width are at the Contractor's option in order to accommodate his trenching equipment, but the pipe bedding material shall extend to the face of the excavation, or sheeting if used. Embedment material shall be Class II.

3.03 TRENCH STABILIZATION

Trench bottoms which are rendered soft or unstable as a result of construction methods, such as improper or inadequate sheeting, dewatering or other causes, shall be stabilized. In no event shall pipe be installed when such conditions exist. The Contractor shall correct such conditions so as to provide proper bedding or foundations for the proposed installation.

3.04 TRENCH OVERCUT

A. If, after excavating the trench to a depth of 2 feet 6 inches below the outside bottom elevation of the proposed pipe barrel, and the soil at that depth is still unsatisfactory as foundation material because it contains marl, muck, organic matter, or other unsuitable material, the pipe trench shall be excavated further in one-foot depth increments until a suitable foundation material is found. As a point of reference, it has been the City's experience that, typically, trench overcut does not extend to depths more than 6 feet. However, the City reserves the right to require trench overcut to depths up to 6 feet, i.e., to a point 8.5 feet below the bottom of the pipe.

B. Select backfill, as defined above, shall then be compacted in 6-inch layers up to the bottom of the proposed 6 inches of pipe bedding.

3.05 REMOVAL OF WATER

A. It is a basic requirement of these Specifications that excavation shall be free from water before pipe or structures are installed. However, it is realized that in certain sections of the work this cannot be accomplished economically and the Contractor may request permission to use the "Alternate Method of Construction" defined below.

B. The Contractor shall provide all necessary pumps, underdrains, well point systems, and other means for removing water from trenches and other parts of the work including structures. The Contractor shall continue dewatering operations until the backfill has progressed to a sufficient height over the pipe to prevent flotation or movement of the pipe in the trench, so that the backfill is above the natural water level.

C. Where applicable, the Contractor shall be required to obtain all necessary permits approving the location and proposed method of disposal before discharging water from any excavation into any portion of the public right-of-away or into any existing drainage structure or facility.

D. Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, or to cause interference with the use of the same by public. Submit the proposed method of handling and disposal of trench waster for approval before starting the excavation.

E. The Contractor is cautioned that the County or other governing body having jurisdiction over the work location may have regulatory rules and ordinances prohibiting, or limiting, the discharge of water from any excavation into sanitary and storm sewer systems, or to canals and drainage ditches. Obtain all necessary permits approving the location and proposed method of disposal before discharging water from any excavation into any portion of the public right-of-way, or into any existing drainage structure or facility.

F. Pumps and engines for dewatering systems shall be operated with mufflers and a minimum noise level suitable to a residential area. The Contractor shall be responsible for any nuisance created due to the disposal of the water from his discharge system.

3.06 INSTALLATION OF BACKFILL

A. Backfilling of pipe trenches will not be allowed until the work has been approved by the City, pressure tested if required, and the City indicates that backfilling may proceed. Any work which is covered or concealed without the knowledge and consent of the City shall be uncovered or exposed for inspection. Partial backfill may be made to help restrain the pipe during pressure testing, if previously authorized by the City.

B. The Contractor shall backfill all trenches and other excavations made in the process of installing the pipe. He shall maintain the surface of the backfill free from major irregularities and potholes.

C. Select backfill material shall be placed under and around the pipe to one foot above the crown (or to two feet above crown for PVC gravity sewers) in 6-inch layers. Each layer shall be thoroughly compacted to at least 90 percent of maximum density as defined by AASHTO Standard No. T-180, "Moisture-Density Relations of Soils using a 10-lb. (4.54 kg.) Rammer and an 18-in. (457 mm) Drop". The material in the ditch may be compacted by either hand tamper or a mechanized power tamper, provided the results obtained meet the continued approval of the City. Particular attention and care shall be exercised in obtaining thorough support for the branch of all service connection fittings. Care shall be taken to preserve the alignment and gradient of the installed pipe.

D. Backfilling and compacting of material lying above a point one foot (or two feet for PVC pipe), above the crown of the pipe and below the pavement base or the surface of the

ground, if out of pavement, shall be accomplished in layers not exceeding 9 inches in thickness. Each layer shall be thoroughly compacted with a powered hand tamper or a mechanized power tamper to at least 98 percent of maximum density as determined by AASHTO Specification T-180 or such greater density as may be required by the governing authority over the area in which the work is performed. A testing laboratory will make periodic field tests to determine the density being obtained in each lift, or layer, or the backfill. When compacted backfill fails to meet the specified percentage of maximum density as shown by test results, it shall be reworked and recompacted, and then retested. The reworking, recompacting and retesting of the backfill shall be repeated as many times as may be necessary to obtain compacted backfill with density meeting or exceeding the specified percentage as indicated by test results.

E. The Contractor shall exercise proper care to insure that no pipe will be broken or displaced through the use of the type of mechanical compacting equipment he selects. Water shall be added as required to obtain optimum moisture to facilitate compaction, but ponding or inundation of backfill will not be permitted. These ponding limitations shall not prohibit backfill in a wet trench up to the level of the natural water table if the "Alternate Method of Construction" is utilized.

F. Backfill shall in general be kept up with the rate of pipe laying. The backfill up to the springline of the pipe shall be placed as soon as practical after the laying of the pipe. On parts of the line where ground water level may be high enough to float the pipe, the placing of the backfill and the rate of pumping the trench shall be so controlled as to prevent the pipe from floating or moving from the line and grade shown on the Plans.

G. In the event that sufficient suitable material is not available at any point to properly backfill the trench, the Contractor shall transport suitable material from points of the line where such material is available or shall otherwise furnish suitable material.

H. Suitable material in excess of all backfill requirements and all unsuitable material shall be removed from the work and disposed of by the Contractor.

I. Within paved areas of trench excavation, the base and surfacing shall be reconstructed as required by the agency having jurisdictional authority over the ROW limits.

J. Where cuts have been made through unpaved, stabilized rock roadways, driveways and parkways, surface restoration shall consist of 3 inches of compacted limerock overlaid by 3 inches of gravel or graded and washed rock with a maximum diameter of ½-inch, except as otherwise directed by the City. The rock shall be installed over the entire width of the disturbed area and shall closely match the existing rock at each location. Several grades of rock may be required to attain this end, but it is not anticipated that more than one grade will have to be used at any one location.

K. Backfill for Structures: See Division 2 specifications.

3.07 INSTALLATION OF PIPE BEDDING - FORCE MAIN AND WATER MAIN

A. As described above, all pipe trenches shall be excavated to a level 6-inches below the outside bottom of the proposed pipe barrel. The resulting excavation shall be backfilled with approved pipe bedding material, up to the level of the outside bottom of the proposed pipe barrel. This material shall be tamped and compacted to provide a proper bedding for the pipe and shall then be shaped to receive the pipe, including recesses for the pipe bells and couplings. Placing and compacting bedding up to the level of the lower one-third of the pipe barrel shall immediately follow the installation of the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

B. Select Backfill material may be utilized where the excavated trench bottom is above water.

C. Any excavation below the levels required for installation of the pipe bedding shall be backfilled with approved bedding material, tamped, compacted and shaped to provide proper support for the proposed pipe.

3.08 COMPACTION AND DENSITIES

A. Methods of control and testing of backfill construction to be employed in this work are:

1. Maximum density of the material in trenches shall be determined by AASHTO Designation T 180.

2. Field density of the backfill material in place shall be determined by AASHTO Designation T 238.

B. Laboratory and field density tests are necessary to establish compliance with the compaction requirements of these specifications. The City will not accepts projects for which successful laboratory and field density test results are submitted. Tests will be made at depths and locations to the satisfaction of the City.

C. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompacted until the required compaction is secured.

3.09 ALTERNATE METHOD OF CONSTRUCTION

A. General:

1. A combination of conditions in the substrata, water table, or method of disposal may be encountered during the course of the work which make dewatering impossible, or only possible through the use of unusual methods, the cost of which is excessive. When such conditions are encountered, but only after all reasonable means to dewater the excavation have been employed without success, the Contractor, with the concurrence of the City may elect to employ the following alternate method of construction. The concurrence of the City shall be obtained and the Contractor shall limit the use of the alternate method

of construction to such specific portions of the work as determined applicable.

2. The requirements set forth in other sections of these Specifications shall establish the required standards of construction quality for this work. Use of the alternate method of construction described hereinafter shall in no way be construed as relieving the Contractor of his basic responsibility for satisfactory completion of the work.

3. Subject to all of the requirements stated hereinabove, including approval by the City, construction will be permitted in accordance with the following specifications.

B. Removal of Water: The installation of pipe, manholes and appurtenances under water will be permitted and the dry-trench requirements of "Removal of Water" will be waived.

C. Excavation: Excavation shall be performed in accordance with normal applicable excavation specifications.

D. Pipe Bedding for Ductile Iron and Vitrified Clay Pipe:

1. Pipe bedding shall be placed from 6-inches below the outside bottom of the proposed pipe barrel up to the level of the springline of the pipe barrel of gravity sewers and to the level of the lower one-third of the pipe barrel for force mains or water mains. The bedding material shall be washrock, drainfield limerock or approved material. Limerock screenings, sand or other fine organic material shall not be used.

2. The bedding material used shall be tamped and graded to provide a proper bedding for the pipe and shall then be shaped to receive the pipe. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting.

E. Bedding for PVC Pipe: The pipe bedding, haunching and initial backfill material shall conform to embedment material listed in the Division 2 specifications for either stable or unstable soil conditions as required, and shall be placed and compacted in as stated in "Installation of Pipe Bedding", above.

F. Backfill:

1. After the pipe is installed, backfilling shall proceed in accordance with the provisions of "Installation of Backfill", except that select backfill material or pipe bedding material shall be used to backfill around the pipe and to a level one foot above the outside top (crown) of the pipe.

Under no circumstances shall material other than select backfill or specified pipe bedding material be considered satisfactory for this purpose.

2. If the Alternate Method of Construction is used, all backfill material, shall be carefully lifted into the trench and released to fall freely therein when the bucket or container is near or at a moderate height above water level. Height of release shall be to the satisfaction of the City. Below the existing water level, and to a point not more than 18-inches above the water level, the backfill material shall be carefully placed into place in uniform layers, of equal depth on each side of the pipe. From a point not more than 18-inches above the water level, and below the pavement base or the surface of the ground if out of paving, backfill material shall be placed and compacted for normal backfilling as provided in "Installation of Backfill" and "Compaction and Densities".

G. Backfill for PVC Gravity Sewers:

1. After the pipe is installed, backfilling shall proceed in accordance with the provisions of "Installation of Backfill", except that select backfill material or pipe bedding material shall be used to backfill to a level two feet above the outside top (crown) of the pipe. Under no circumstances shall material other than select backfill or specified pipe bedding material be considered satisfactory for this purpose.

2. If the Alternate Method of Construction is used, all embedment and backfill material, shall be carefully lifted into the trench and released to fall freely therein until the bucket or container is at or just above water level. Below the existing water level, and to a point not more than 18-inches above the water level, the backfill material shall be carefully placed into place in uniform layers, of equal depth on each side of the pipe. From a point not more than 18-inches above the water level, and below the pavement base or the surface of the ground if out of paving, backfill material shall be placed and compacted for normal backfilling as provided in "Installation of Backfill" and "Compaction and Densities".

3.10 RESTORATION OF EXISTING SURFACES

Paved and grassed areas disturbed by the operations required under this Section shall be restored as indicated on the approved Plans and/or specified herein.

END OF SECTION

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SECTION 02500

LANDSCAPING

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Items specified in this Section include the installation of new landscaping, or repairs to existing landscaped and grassed areas that may be damaged or disturbed by Contractor activities. The Contractor is to protect existing trees and landscaping, obtain approvals prior to trimming or removal, and replace in kind if removal is approved by the City.

B. Landscaping requirements are as noted on the Drawings for removal and replacement of existing palm trees.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 2.

1.03 SUBMITTALS/SHOP DRAWINGS

A. The Contractor shall submit submittals for review in accordance with the Section 01340.

1.04 DEFINITIONS

A. FDOT Specifications shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. The FDOT Specifications are referred to herein and 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 in their entirety.

1.05 PROTECTION OF EXISTING IMPROVEMENTS

A. The Contractor shall be responsible for the protection of all pavements and other improvements within the work area. All damage to such improvements, as a result of the Contractor's operations, beyond the limits of the work of pavement replacement shall be repaired by the Contractor at his expense.

1.06 GUARANTEE

A. The Contractor shall guarantee all trees, ground cover or shrubs planted or replanted under this Contract for a period of one year beyond closeout of the project. In the event that any new tree, plant or shrub dies within the guarantee period, the Contractor shall be responsible for replacement in kind. In the event that a transplanted (reused) tree dies within the guarantee period, the Contractor shall be responsible for replacement in kind, except that the maximum height of any new tree shall be eight feet as measured from the ground surface, once planted, to the top of the tree.

PART 2 - PRODUCTS

2.01 REPLACEMENT TREES, GROUND COVER AND SHRUBS

A. Replacement trees, ground cover and shrubs shall be of the same type and size and sound, healthy and vigorous, well branched and densely foliated when in leaf. They shall have healthy, well developed root systems and shall be free of disease and insect pests, eggs or larvae.

2.02 MULCH

A. Mulch shall be windproof shredded eucalyptus, mulch shall be clean, fresh, free of branches and other foreign matter. Mulch shall be used around all shrubs, ground covers and tree trunks, and placed to a minimum depth of 2 inches extending from the tree trunk outward two feet.

2.03 GRAVEL BEDS

A. Filter Fabric: Filter fabric shall be nonwoven polyester material Trevia Type 1120 as manufactured by Hoechst Fibers Industries, or equal. Fabric weight shall be 6 ounces per square yard, puncture strength maximum 40 pounds, minimum Flux 240 gallons per minute per square foot. Fabric shall be installed in accordance with the manufacturer's recommendations, with precautions taken to avoid tearing the fabric. Fabric shall be laid in strips with a minimum overlap of one foot.

B. Limerock: Limerock shall meet ASTM A57 standards and shall be prewashed. Maximum size shall be 3/4 inches. Limerock shall be carefully placed and spread on the fabric to a minimum depth of 6 inches. Final grades and locations shall be as designated on the Drawings.

PART 3 - EXECUTION

3.01 GRADING AND SODDING

A. Finished grading to be provided in accordance with Section 02260.

B. Sodding to be provided in accordance with Section 02930.

3.02 TREES, GROUND COVER AND SHRUBS

A. Excavation and Plant Holes: Plant hole excavations shall be roughly cylindrical in shape, with the side approximately vertical. Plants shall be centered in the hole. Bottoms of the holes shall be loosened at least six inches deeper than the required depth of excavation.

B. Holes for balled and burlaped plants shall be large enough to allow at least eight inches of backfill around the earth ball. For root balls over 18 inches in diameter, this dimension shall be increased to 12 inches. Where excess material has been excavated from the plant hole, the excavated material shall be disposed of as and where directed by the Engineer.

C. Setting of Plants: The Contractor, when setting plants in holes, shall make sure that when lowered into the hole, the plant shall rest on a prepared hole bottom such that the roots are level with, or slightly above, the level of their previous growth and so oriented such as to present the best appearance.

D. Palms of the Sabal species may be set deeper than the depth of their original growth, provided that the specified clear trunk height is attained.

E. The backfill shall be made with planting mixture and shall be firmly rodded and watered-in, so that no air pockets remain. The quantity of water applied immediately upon planting shall be sufficient to thoroughly moisten all of the backfilled earth. Plants shall be kept in a moistened condition for the duration of the Contract.

F. Staking and Guying: Plants shall be staked in accordance with the following provisions:

1. Small Trees: For trees and shrubs of less than one-inch caliper, the size of stakes and the method of tying shall be such as to rigidly support the staked plant against damage caused by wind action or other effects. Trees larger than one inch and smaller than one and one-half inch caliper shall be staked with a two-inch stake, set at least 24 inches in the ground and extending to the crown of the plant. The plant shall be firmly fastened to the stake with two strands of 14 gauge soft wire, enclosed in rubber hose, or other approved covering. The wire shall then be nailed or stapled to the stake to prevent slippage.

2. Medium Trees: All trees, other than palm trees, larger than one and one-half inch caliper and smaller than two and one-half inch caliper shall be staked with two or more, two-inch by two-inch stakes, eight feet long, set two feet in the ground. The tree shall be midway between the stakes and held firmly in place by two strands of 12-gauge wire, applied as specified above for single stakes. The wires shall be tightened and kept tight by twisting.

3. Large Trees: All trees, other than palm trees, larger than two and one-half inch caliper, shall be braced with three or more two-inch by four-inch wood braces, toenailed to cleats which are securely banded at two pints to the palm, at a point at least six feet above the ground. The trunk shall be padded with five layers of burlap under the cleats.

Braces shall be approximately equidistantly spaced and secured underground with two-inch by four-inch by 24-inch stake pads. In firm rock soils, Number 4 steel reinforcing rods or one-half inch pipe is acceptable.

4. Palm Trees: Palm trees shall be braced with three or more two-inch by four-inch wood braces, toenailed to cleats which are securely banded at two points to the palm, at a point at least six feet above the ground. The trunk shall be padded with five layers of burlap under the cleats. Braces shall be approximately equidistantly spaced and secured underground with two-inch by four-inch by 24-inch stake pads. In firm rock soils, Number 4 steel reinforcing rods or one-half inch pipe is acceptable.

G. Pruning: All broken or damaged roots shall be cut off smoothly, and the tops of all trees shall be pruned in a manner complying with standard horticultural practice. At the time pruning is completed, all remaining wood shall be alive. All cut surfaces of one inch or more in diameter, above the ground, shall be treated with approved commercial tree paint.

H. Maintenance: Maintenance shall begin immediately after each plant is planted and shall continue until all work under this Contract has been completed and accepted by the City. Plants shall be watered, mulched, weeded, pruned, sprayed, fertilized, cultivated and otherwise maintained and protected. Settled plants shall be reset to proper grade position, planting saucer restored and dead material removed. Guys shall be tightened and repaired.

I. Defective work shall be corrected as soon as possible after it becomes apparent. Upon completion of planting, the Contractor shall remove excess soil and debris, and repair any damage to structures, etc., resulting from planting operations.

3.03 GRAVEL BEDS

A. Clean, grade and place geotextile prior to placing gravel in gravel beds.

END OF SECTION

SECTION 02574

PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Work included under this Section consists of cutting, removing, protecting and replacing existing pavements, driveways, sidewalks, curb and combination curb and gutter of the various types encountered.

B. Protection of Existing Improvements: The Contractor shall be responsible for the protection of all pavements, sidewalks and other improvements within the work area. All damage to such improvements, as a result of the Contractor's operations, beyond the limits of the work of pavement replacement as described herein, shall be repaired by the Contractor at his expense.

C. Related Work Described Elsewhere:

1. Division 2.

1.02 DEFINITIONS

A. Surface Cap: A ½-inch thick crust of sprayed asphalt over the backfilled open cut area with sand spread over the sprayed surface.

B. Surface Patch: A temporary asphalt surface with a minimum 1-inch of thickness as specified in Paragraph 3.01.A.1.d.

C. Complete Replacement / Overlay: A complete resurfacing of the entire width of the street with asphaltic concrete 2-inches thick.

D. Pavement thicknesses will be required to be matched in kind. The Contractor must verify all pavement thickness elevations prior to commencement of construction. Failure to do so will not allow for the Contractor to make any claims for compensation for pavement thicknesses to be matched which are in excess of the specifications herein or as shown on the City’s standard drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials, including stabilized subgrade, base, bituminous prime and tack coat, and asphaltic concrete for the above work shall meet the requirements established herein.

1. Stabilized subgrade shall conform the Florida Department of Transportation (FDOT) Standard Specification of Road and Bridge Construction (latest edition).

2. Base material shall be limerock conforming the FDOT Standard Specification of Road and Bridge Construction (latest edition).

3. Bituminous prime and tack coat materials shall conform to the FDOT Standard Specification of Road and Bridge Construction (latest edition).

4. Asphalt concrete shall be Type SP 9.5 or 12.5 depending on thickness required or to match existing and conform the FDOT Standard Specification of Road and Bridge Construction (latest edition).

5. Portland cement concrete shall conform to the FDOT Standard Specification of Road and Bridge Construction (latest edition).

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Removals:

1. Pavement Removal:

a. Where existing pavement is to be removed, the surfacing shall be mechanical saw cut prior to trench excavation, leaving a uniform and straight edge, with minimum disturbance to the remaining adjacent surfacing. The width of cut for this phase of existing pavement removal shall be minimized.

b. Immediately following the specified backfilling and compaction, a temporary sand seal coat surface or temporary asphalt surface shall be applied to the cut areas. This temporary surfacing shall provide a smooth traffic surface with the existing roadway and shall be maintained until final restoration. Said surfacing shall remain for 10 days in order to assure the stability of the backfill under normal traffic conditions. Following this period and prior to 15 days after application, the temporary surfacing shall be removed and final roadway surface restoration accomplished.

c. In advance of final restoration, the temporary surfacing shall be removed and the existing pavement mechanically sawed straight and clean to the

dimensions specified in the drawings. Following the above operation, the Contractor shall proceed immediately with final pavement restoration in accordance with these requirements.

2. Sidewalk, Drive & Curb Removal:

a. Concrete sidewalks, curbs, combination curb and gutter, walks, drive ribbons, or driveways shall be removed by initially sawing the structure, with a suitable power saw, as specified above for pavement. The removal line shall be extended to the next joint, each way. After sawing, the material shall be removed. Temporary paths of travel shall be provided to maintain pedestrian traffic. Particular attention should be given to providing accessible routes to the disabled.

b. All open-cut driveways are to be restored within 24-hours with an all-weather asphaltic paver to permit temporary property access until final restoration is completed.

B. Restorations:

1. General: Street or roadway pavement cut and removed in connection with trench excavation shall be replaced or restored in equal or better condition than the original and as shown on the Drawings. Street or roadway pavement restoration shall begin immediately upon completion of backfill and compaction or curing of flowable backfill. The Drawings indicate minimum requirements.

2. Asphalt Pavement Restoration: Restoration of existing pavement shall be in accordance with the provisions the FDOT Standard Specifications for Road and Bridge Construction (latest edition). Asphaltic concrete shall be Super Pave Type 12.5 or match existing, a minimum of 3 inches thick or as otherwise required by City or FDOT standards.

3. Asphalt Driveway Restoration: Driveway pavement with base cut and removed in connection with trench excavation shall be replaced or restored as specified above for street or roadway pavement, except the new base course shall equal the existing base course in thickness, except that in no case shall new driveway base course be less than 8 inches in thickness and the asphaltic concrete shall be Super Pave Type 12.5, 3 inches thick. Muck or unsuitable material found under existing driveway construction will not be removed and replaced.

4. Concrete, Sidewalk, Walkway, Driveway Ribbon and Curb Restoration:

a. Concrete sidewalks, walkways, driveways, driveway ribbons and curbs required to be removed for the installation of facilities under this Contract shall be restored. Class B concrete shall be used in all cases.

b. Replaced portions of these items shall conform to the lines, grades, and cross sections of the removed portions. Concrete sidewalks and

walkways subject to vehicular traffic shall be of 6-inch thickness; concrete sidewalks and walkways not subject to vehicular traffic shall be of 4-inch thickness; concrete driveways and driveway ribbons shall be 6-inch thickness. Replaced concrete curb and/or gutter shall extend the next control joint, each way.

5. Concrete Pavement Restoration: Rigid pavement shall be replaced in kind with Class B concrete, using high early strength cement. The base course for rigid pavement shall be replaced in kind and compacted to a thickness to match the existing base.

6. Asphaltic Concrete Surface course Overlay:

   a. The work under this section includes asphaltic concrete surface course overlay paving as and where directed by the ENGINEER. Where this paving is directed it shall take the place of asphaltic concrete pavement restoration as specified herein above. This surface course overlay shall extend over the reconstructed base course and the existing pavement to the limits directed by the Engineer, which generally shall be the full width of the roadway.

   b. After the base course construction in the trench area has been completed and primed, the asphalt pavement surface shall be tack coated and a 1-1/2 inch compacted thickness of Super Pave Type 12.5 asphaltic concrete shall be constructed in accordance with the requirements specified above for pavement restoration.

END OF SECTION

SECTION 02580

PAVEMENT MARKING

PART 1 - GENERAL

1.01 REQUIREMENT

A. This section consists of striping pavement, pavement markings and parking stall wheel stops as indicated on the Drawings, specified herein, and as required for a complete installation.

1.02 SUBMITTALS

A. The Contractor shall submit shop drawings and other information to the Engineer for review in accordance with Section 01300, Submittals.

B. Submittals must be in compliance with the agency having jurisdictional authority over the right-of-way limits of the roadway. The Contractor is responsible for meeting all necessary striping and pavement marking requirements for the various roadways and alleyways included in this project.

1.03 QUALITY CONTROL

A. The phrase "FDOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. The FDOT Specifications, are referred to herein and 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 in their entirety. “BCTED” shall refer to Broward County Traffic Engineering Division.

PART 2 - PRODUCTS

2.01 PAVEMENT MARKING

A. Pavement stripes shall be thermoplastic.

PART 3 - EXECUTION

3.01 PAVEMENT MARKING

A. The surface which is to be painted shall be cleaned, by compressed air or other effective means, immediately before the start of painting, and shall be clean and dry when the paint is applied. Any vegetation or soil shall be removed from the pavement before edge striping is begun.

B. The traffic stripe shall be of the specified width, with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained and the finished stripe shall contain no light spots or paint skips. Any stripes which do not have a uniform, satisfactory appearance, both day and night, shall be corrected.

C. All newly painted stripes, including edge stripes, shall be protected until the paint is sufficiently dry to permit vehicles to cross the stripe without damage from the tires. While the center line stripes are being painted, all traffic shall be rouged away from the painting operations and the newly painted stripe. When necessary, a pilot car shall be used to protect the painting operations from traffic interference.

D. Any portions of the stripes damaged by passing traffic or from other cause shall be repainted at the Contractor's expense.

1. Thermoplastic Traffic Stripes and Markings: Thermoplastic pavement markings, including stripes, pavement messages, stop bars, directional arrows, reflective pavement markers and other miscellaneous items, will be replaced to match preconstruction conditions.. The thermoplastic compound shall be as specified in the FDOT Specifications. The thermoplastic compound shall be extruded or sprayed onto the pavement surface in a molten state by mechanical means, with surface application of glass spheres, when required, and upon cooling to ambient pavement temperature shall produce an adherent pavement marking of specified thickness and width and capable of resisting deformation.

E. The portion of the pavement surface or thermoplastic marking to which the marker is attached by the adhesive shall be cleaned of dirt, curing compound, grease, oil, moisture, loose or unsound pavement and any other material which would adversely affect the adhesive. Reflective markers shall be installed in such a manner that the reflective face of the marker is perpendicular to a line parallel to the roadway centerline. No markers shall be installed over longitudinal or transverse joints of the pavement surface. The adhesive shall be spread on the bonding surface (not the marker) so that 100 percent of the bonding area of the marker will be covered.

F. The adhesive application shall be of sufficient thickness so that when the marker is pressed into the adhesive, excess adhesive shall be forced out around the entire perimeter of the marker. All excessive adhesive shall be removed from in front of the reflective faces. If any adhesive or foreign matter adheres to the reflective face of the marker, the marker shall be replaced. The Engineer shall determine the minimum time necessary to cure the adhesive for sufficient set to bear traffic.

END OF SECTION

SECTION 02582

RAISED RETRO-REFLECTIVE PAVEMENT MARKERS AND BITUMINOUS ADHESIVE

PART 1 - GENERAL

1.01 REQUIREMENTS

A. Place raised retro-reflective pavement markers (RPMs) and adhesive, which upon installation produces a positive guidance system to supplement other reflective pavement markings.

PART 2 - PRODUCTS

2.01 PAVEMENT MARKERS

A. Use only Class B markers unless otherwise shown in the Plans. Meet the requirements of the Florida Department of Transportation, latest edition. Use only reflective pavement markers and bituminous adhesive that are listed on the City's Qualified Products List (QPL). Provide to the Engineer a manufacturer's certification conforming to the requirements of Section 6, which confirms that each product meets the requirements of this Section.

2.02 CONTRACTOR'S RESPONSIBILITY FOR NOTIFICATION

A. Notify the Engineer prior to the placement of RPMs. At the time of notification, indicate the manufacturer and the LOT numbers of RPMs and bituminous adhesive that are intended for use. Verify that the approved LOT numbers appear on the material packages. Furnish a test report to the Engineer certifying that the materials meet all requirements specified.

PART 3 - EXECUTION

3.01 APPLICATION

A. Use equipment having either thermostatically controlled double boiler type units utilizing heat transfer oil or thermostatically controlled electric heating pots to install hot applied bituminous adhesive. Do not use direct flame melting units with flexible adhesives; however, this type of unit may be used with standard adhesive in accordance with manufacturer's recommendations. Use a melter/applicator unit suited for both melting and pumping the adhesive through heated applicator hoses.

B. Heat the adhesive to between 375°F and 425ºF and apply directly to the bonding surface from the melter/applicator by either pumping or pouring. Maintain the application temperature between 375°F and 425ºF. The adhesive may be reheated. However, do not exceed the manufacturer's recommendations for pot life at application temperatures.

C. Apply RPMs to the bonding surface using bituminous adhesives only. The Engineer will conduct field testing in accordance with FM 5-566. Correct RPMs not applied in accordance with these requirements at no cost to the Department.

D. Prior to application of adhesive, clean the portion of the bonding surface of any material which would adversely affect the adhesive.

E. Apply the adhesive to the bonding surface (not the marker) so that 100% of the bonding area of the marker will be covered, in accordance with adhesive manufacturer's recommendations. Apply sufficient adhesive to ensure, that when the marker is pressed downward into the adhesive, adhesive will be forced out around the entire perimeter of the marker.

F. Immediately remove excess adhesive from the bonding surface and exposed surfaces of the RPMs. Soft rags moistened with mineral spirits meeting Federal Specifications TT-T-291 or kerosene may be used to remove adhesive from exposed faces of the RPMs. Do not use any other solvent. If any adhesive, pavement marking materials or other foreign matter adheres to the reflective face of the marker, replace the marker at no cost to the Department.

G. Install RPMs with the reflective face of the RPM perpendicular to a line parallel to the roadway centerline.

H. Ensure that all final RPMs are in place prior to opening the road to traffic. If more than 2% of the RPMs fail in adhesion or alignment within the first 45 days under traffic, replace all failed markers at no expense to the Department. If more than 5% of the markers fail in adhesion and or alignment during the initial 45 day period, the Engineer will extend the replacement period an additional 45 days from the date that all replacement markers have been installed. If, at the end of the additional 45 day period, more than 2% of all markers (initial installation and 45 day replacements combined) fail in adhesion or alignment, replace all failed markers at no expense to the Department.

I. Contractor's Responsibility for Notification: Notify the Engineer prior to the placement of RPMs. At the time of notification, indicate the manufacturer and the LOT numbers of RPMs and bituminous adhesive that are intended for use. Verify that the approved LOT numbers appear on the material packages. Furnish a test report to the Engineer certifying that the materials meet all requirements specified.

END OF SECTION

SECTION 02661

WASTEWATER FORCE MAINS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work under this Section includes providing a complete system for wastewater transmission pressure piping and appurtenant items. See Section 15050 for additional requirements.

1.02 QUALITY ASSURANCE

A. Design Requirements

1. Piping shall be laid with a minimum cover of 36-inches below finished grade, unless otherwise indicated.

2. Pipelines shall be constructed of the materials indicated on the Drawings.

3. All force mains shall be installed with a continuous insulated 6-gauge bare copper wire. Wire shall terminate at the top of each valve and be capable of extending 18-inches above the top of the box.

4. All PVC force mains shall be solid green. HDPE force mains require striping per Section 15050. All lettering shall appear legibly on the pipe and shall run the entire length of the pipe. Lettering shall read as is acceptable for the intended use.

5. Flanged ductile iron used in valve vaults, above ground piping at pump stations, or aerial crossings shall be Protecto 401 lined and coated per specification Section 09901 - Coatings and Linings. Flanged DIP shall be epoxy coated from the factory and shall not be coated with bitumastic or asphaltic exterior coatings.

6. Welded steel within the pump stations shall conform to Section 15065.

B. Pipe Inspection: The Contractor shall obtain from the pipe manufacturers a certificate of inspection to the effect that the pipe and fittings supplied for this contract have been inspected at the plant and that they meet the requirements of these specifications. All pipe and fittings shall be subjected to visual inspection at time of delivery and just before they are lowered into the trench to be laid. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor. The entire product of any plant may be rejected when, in the opinion of the City, the methods of manufacture fail to secure uniform results, or where the materials used produce inferior pipe or fittings.

C. Prevention of Electrolysis: Electrolytic action through the contact of dissimilar metals shall

be required to be prevented by the Contractor by either;

1. The separation of one material from the other by means of an insulating or dielectric coupling (polyethylene wrap), or

2. The use of alternative materials, as directed by the City.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City and Engineer for review and acceptance prior to construction in accordance with the General Conditions and specifications.

1. Certified test reports on pipe.

2. Details of restrained and flexible joints.

3. Detailed laying schedule for pipe.

4. Valves and valve boxes.

B. Acceptance of Material: The City reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

1.04 JOB CONDITIONS

A. Water in Excavation: Contractor is to refer to the specifications herein for constructing piping in the “wet”. The Contractor shall not open more trenches than the available pumping facilities are able to dewater to the satisfaction of the City. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working. In no case shall the pipelines being installed be used as drains for such water, and the ends of the pipe shall be kept properly and adequately blocked during construction by the use of acceptable stoppers and not by improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the Work any such material has entered the pipelines, it must be cleaned as directed by the City so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products as specified in the List of Approved Products appended to these technical specifications.

2.02 MATERIALS

A. Pipe Fittings, Valves, and Ancillary Equipment shall be installed as shown on the Drawings and as specified in Division 15.

B. Additional Work: Additional items of construction, necessary for the complete installation of the systems, shall conform to specific details shown on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Bedding: Upon satisfactory installation of the pipe bedding material as specified within these technical specifications, a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. The pipe shall be laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.

B. Cleanliness: The interior of the pipes shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during laying operations by means of plugs or other methods acceptable by the City. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

3.02 INSTALLATION

A. Pipe Identification/Location

1. All PVC wastewater mains shall be solid green in color. All lettering shall appear legibly on the pipe and shall run the entire length of the pipe. Lettering shall read as is acceptable for the intended use.

2. All HDPE wastewater mains shall be either a solid green or black with four co-extruded equally spaced green stripes of the same material as the pipe. Stripes painted on the pipe outside surface shall not be acceptable.

3. If main is located over 30-feet from the edge of the pavement, in an easement, or adjacent to an aerial crossing, the Contractor shall install 4-inch diameter schedule 80 PVC utility pipe line markers over the pipe alignment at 1,000-feet intervals, at all valves, and at all locations where fittings deflect the pipe alignment in the horizontal plane and including both sides of aerial crossing locations. Utility pipeline markers shall include a decal and shall be colored purple for reclaimed water service.

4. All mains (PVC and HDPE) shall be installed with a continuous, insulated 6-gauge bare copper wire installed directly above the pipe for location purposes. Locate wire shall terminate in a test station box and be capable of extending 12-inches above the top of the box. Directionally drilled pipe shall be installed with two insulated 10-gauge copper wires.

B. Pipe:

1. Gradient: Lines shall be laid straight, and depth of cover shall vary to provide uniform gradient or slope to pipe, whether grading is completed or proposed at time of pipe installation. When a grade or slope is shown on the Drawings, batter boards with string line paralleling design grade, or other previously approved means, shall be used by the Contractor to assure conformance to required grade.

2. Pipe Joint Deflection: No joint deflection or pipe bending is allowed in PVC pipe. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees), (3-inches per joint per 20-ft stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment changes shall be made with sleeves and fittings as shown in Drawings. Deflection in fittings and sleeves shall not exceed 75% of the limits recommended by the fitting manufacturer. HDPE piping deflection must meet the manufacturer's requirements for the radius of curvature and not exceed or over-deflect the piping.

3. Rejects: Any pipe found defective shall be immediately removed from the site and replaced with sound pipe at the Contractor's expense.

4. Joint Compounds: No sulfur base joint compound shall be used.

5. Thrust restraints shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein.

C. Installing Valves and Boxes:

1. Valves: Valves shall be carefully inspected, opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Plug valves shall have the disc shaft installed horizontally with the plug rotating upward to the top of the valve. Any valve that does not operate correctly shall be removed and replaced.

2. Valve Boxes: Valve boxes and riser shall be centered over the operating nuts of the valves with a centering ring or disc so as to permit a valve key to be fitted easily to the operating nut. In unpaved areas, valve boxes shall be set to conform to the level of the finished surface and held in position by a concrete collar placed under the support flange as shown on the Drawings. The valve box shall not transmit surface loads to the pipe or valve. Extensions or risers for valve boxes shall be an integral part of the box. No cut sections of D.I. or PVC pipe shall be used in extending the box to its proper height. Care shall be taken to prevent earth and other material from entering the valve box. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug out and reset. Before final acceptance of the Work all valve boxes shall be adjusted to finish grade.

D. Concrete Encasement:

1. Concrete encasement shall be constructed in accordance with details shown on the Drawings and shall be constructed of Class C concrete. Encasement shall be constructed where

a. Indicated on the Drawings

b. Directed by the City

2. The points of beginning and ending of pipe encasement shall be not more than 6-inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.

3. Concrete Collar: Each valve installed in an unimproved area (outside of pavement, driveways or sidewalks) shall require a 24-inch x 24-inch x 6-inch concrete pad or collar as shown in the Drawings.

E. Flush Out Connections: Flush out connections, if directed by the City, shall be installed at the locations as determined by the City and be full pipe size to accommodate a full diameter flush for pipes 12-inches and smaller or a swab for pipes greater than 12-inches.

F. Backfilling: Backfilling shall be in accordance with Division 2 specifications.

3.03 CLEANING

A. General: At the conclusion of the Work the Contractor shall thoroughly clean the new

pipe lines by flushing with water or other means to remove all dirt, stones or other material which may have entered the line during the construction period.

B. Flushing 12-inch pipes and less: Flushing to remove all sand and other foreign matter from pipelines shall only be permitted for mains 12-inches and smaller. Flushing shall be accomplished through full pipe size connections at full pipe depth. The velocity of the flushing water shall be at least 4-feet per second. Flushing shall be terminated at the direction of the City. The Contractor shall dispose of the flushing water without causing a nuisance or property damage. The Contractor shall arrange and pay for the source of flushing water with the City or others.

C. Swabbing in lieu of flushing: New mains may be hydraulically or pneumatically cleaned with a polypropylene swabbing device to remove dirt, sand and debris from main. If swabbing access and egress points are not provided in the design drawings, it will be the responsibility of the Contractor to provide temporary access and egress points for the cleaning, as required. Passage of cleaning poly swabs through the system shall be constantly monitored, controlled and all poly swabs entered into the system shall be individually marked and identified so that the exiting of the poly swabs from the system can be confirmed. Cleaning of the system shall be done in conjunction with the initial filling of the system for its hydrostatic test. After initial slow-fill, pipe shall sit full for 24 hours to facilitate cleaning and collection of debris from interior of pipe. The Contractor shall insert flexible polyurethane foam swabs (2-pounds per cubic foot density) complete with rear polyurethane drive seal, into the first section of pipe. The swabs shall remain there until the pipeline construction is completed. The line to be cleaned shall only be connected to the existing distribution system at a single connection point. Locate and open all new in-line valves beyond the point of connection on the pipeline to be cleaned during the swabbing operation. At the receiver or exit point for the poly swab, the Contractor is responsible for creating a safe environment for collection of debris, water and the swab. Considerations shall be made for protecting surrounding personnel and property and safe retrieval of the swab. Only City personnel shall operate the supply valve from the existing distribution system. Cleaning and flushing shall be accomplished by propelling the swab down the pipeline to the exit point with potable water. Flushing shall continue until the water is completely clear and swab is retrieved.

3.04 FIELD QUALITY CONTROL

A. Correction of Non-Conforming Work: All non-conforming work shall be repaired or replaced by the Contractor at no additional expense to the City. Non-conforming work shall be defined as failure to adhere to any specific or implied directive of this Project Manual and/or the Drawings, including but not limited to pipe not laid true to the lines and grades as shown on the Drawings, damaged or unacceptable materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling, visible or detectable leakage and failure to pass any specified test or inspection.

B. Pressure and Leakage Tests of Pressure Piping – See Section 15995.

C. Test Duration: Test shall be for a period of 2-hours. If during the test, the integrity of the tested line is in question, the City may require a 6-hour pressure test.

END OF SECTION

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SECTION 02751

PREPARATORY CLEANING, ROOT AND TUBERCULATION 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, root and tuberculation 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, tuberculation 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, tubercles 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)

PART 3 EXECUTION

3.1 MATERIAL REMOVAL

A. All sludge, dirt, sand, rocks, grease, roots, tubercles 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, tubercles 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 are 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 disposals 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 AND TUBERCLES 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.

B. Contractor shall carefully evaluate the extent of tuberculation encountered in a pipe prior to proceeding with removal of tubercles. Use of remote power-driven cutting or chain devices during removal of tubercles must be performed avoiding collapse of the host pipe. Contractor must vet the equipment and proposed extent of tubercles removal and obtain authorization from the Project Manager before proceeding with the Work. In order to minimize the risk of sewer collapse during tuberculation removal it would be preferable to leave some of the existing tuberculation in place

and proceed with subsequent lining of the host pipe by using a smaller diameter cure-in-place liner. Contractor shall consult with Project Manager on a case by case basis to get approval on how much removal would be acceptable based on the existing pipe diameter, flow and overall condition of the pipe.

C. Contractor shall have all materials on site that are required to perform lining immediately after tubercles are removed to avoid any delay in necessary lining activities that could compromise the integrity of the host pipe.

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 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 submerge. 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.

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SECTION 02752
PIPE INSPECTION (MAINS AND LATERALS)

PART 1 GENERAL

1.1 SCOPE

A. The work consists of furnishing all labor, materials, accessories, equipment, tools, transportation, services and technical competence for performing all operations required to execute the survey to inspect the entire barrel of main line sewers, the pipe connections to the manholes, the lateral connections, and lateral piping using pan and tilt cameras for both mains and laterals.

B. The survey shall show all defects and determine amount of infiltration entering the sewer system.

1.2 GENERAL

A. After Preparatory Cleaning (including special cleaning involving the mechanical removal of roots, grease, and/or tuberculation where authorized), and before and after rehabilitation work, the pipe sections shall be visually surveyed by means of closed-circuit television, the owner may be present at the inspections. The survey shall be performed one manhole-to-manhole section or one lateral at a time and the flow in the section being surveyed shall be suitably controlled to allow for a complete quality view of the interior of the piping. Mainlines shall be surveyed from the upstream manhole to the downstream manhole

B. Pre videos are those videos that the owner has requested of the contractor to video. Post construction videos are those videos taken after a repair. All videos in PACP, LACP formats and the associated reports are to be submitted, in color, indexed and tabulated to the owner. Only pre videos as described above will be payable, all other videos (such as work videos, post videos) are to be included with the respective rehabilitation items in the bid form. Pre videos will only be paid for once per line.

C. All inspection information furnished by the contractor shall be written to digital media and shall be submitted in printed hard copy and electronic data format utilizing WinCan™ V8. The WinCan™ software shall support the NASSCO PACP and LACP coding. The records shall include, but not be limited to the following for mains and laterals: graphic inspection reports, still pictures of each defect, still pictures above ground of all cleanout locations or projected cleanout locations and others as requested, above ground pictures of sonde locations, and infiltration reports. Main and lateral reports will at a minimum be required to have the following tabulated in a spreadsheet format acceptable to the owner: Lift station number, manhole numbers, main footage, lateral location on the main footage, side of the main the sewer lateral is located on as observed from the upstream manhole looking towards the downstream manhole, lateral count on the run, pipe sizes for all piping surveyed (mains and laterals), notation whether a cleanout is visible, lined or unlined pipe, house address (with lateral survey), LF surveyed, and the contractor comments on suggested rehabilitation required. All the reports, videos and suggestions are to be tabulated and turned in for the city to review.

D. All video files and reports shall be labeled consistent with the OWNER's labeling system. Laterals shall be labeled in the following format: Upstream MH #- Distance from upstream MH-side of the pipe. For example, a lateral 23 foot from MH D43-21 on the right side of the line as observed from

the upstream manhole would be labeled D43-21-23R.

1.3 EQUIPMENT

A. The television cameras used for the surveys shall be specifically designed and constructed for the surveys and shall be of the pan and tilt type. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing a minimum 700 line resolution color video picture. The contractor shall maintain camera in clear focus at all times. Picture quality and definition shall be to the satisfaction of the owner; and if unsatisfactory, equipment shall be removed and replaced with adequate equipment at no additional cost to the owner.

B. The video camera shall include a titler feature capable of showing on the tape the following information:

1. City and State
2. Date/Time
3. Contractor's Name
4. Line Size, Material, and Depth
5. Manhole Identification (both manholes)
6. On-going Footage Counter

1.4 SUBMITTALS

A. The contractor shall submit shop drawings and other information. The contractor's submittals shall include sample spreadsheet tabulation, sample video & reports for mains and laterals. No video surveys will take place until submittals are approved by the owner. The approved submittals will become the benchmark for all future video acceptance and or rejection. Rejected work will be redone at no additional cost to the owner.

PART 2 PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 PRECONSTRUCTION SURVEY

A. Procedure

1. Prior to any repair work, the entire sewer line (from manhole to manhole) shall be televised. The camera shall be placed at the center of the manhole and videotaping shall commence prior to entering the pipe. The contractor shall show the inside of the manhole walls and the pipe connection to the wall at both the upstream and downstream manhole connections (ends of the pipe).

2. The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case shall the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, powered rewinds and tractors or other devices that do not obstruct the camera view or

interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If the camera is being pulled through the sewer line by a hydraulic cleaning unit hose the cleaning nozzle shall be located a minimum of eight (8) feet away from the camera to allow a clear, unobstructed view. Jet nozzle shall be used in front of camera while televising through a dip to draft out water. If, during the survey operation, the television camera will not pass through the entire manhole section, the contractor shall set up his equipment so that the survey can be performed from the opposite manhole no additional payment for this setup will be made.

3. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Measurement meters shall be accurate to tenths of a foot over the length of the section being surveyed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, electronic distance meter or other suitable device. Manhole numbers and linear footage shall be shown on screen during the video survey.

4. Movement of the television camera shall be temporarily halted for a minimum of five seconds at each visible point source of infiltration and/or inflow until the leakage rate from that source is quantified. The camera shall be stopped at all service connections and the service lateral shall be inspected with the pan and tilt camera and look up the lateral and at the entire main / lateral connection. The camera shall also be stopped at active service connections where flow is discharging. If the discharge persists, the property involved shall be checked to determine whether or not the discharge is sewage. If no flows are being discharged from the building, it shall be considered that the observed flow is infiltration/inflow.

B. Field Documentation

1. Television Inspection Forms (Survey Logs). Printed and electronically stored location records shall be kept by the contractor and will clearly show the location in relation to an adjacent manhole of each infiltration point observed during survey. Upstream footage at face of manhole (0) and downstream footage at face of manhole (e.g., 250) shall be shown on the log. The television inspection forms to be utilized by the contractor shall be those mandated by NASSCO's PACP and LACP. Both the "Header" and "Details" information of the form shall be entered as indicated in the PACP standards. The survey logs shall include, but not be limited to the following information:

    a. Correct pipe segment/manhole numbers
    b. Correct address of manhole location
    c. Pipe size, length and material
    d. Manhole depth (up and downstream)
    e. Lift station service area number
    f. Video number and index
    g. Footage locations, descriptions and estimated leak rates for visible point sources of infiltration inflow.
    h. Footage locations and descriptions of structural defects such as obstructions, any remaining root intrusion, offset joints, cracked pipe, fractured pipe, holes, collapses, sags, protruding service connections and/or blockages in the pipe.

    The terminology to be used shall follow NASSCO's PACP and LACP standards. All information will be recorded and a copy of such electronic records and a hard copy will be supplied to the owner, indexed and tabulated.

2. Photographs: Digital photographs of the video shall be taken by the contractor and included in the digital WinCan report. Photographs will include, pipe defects, manhole connections, lateral connections, property line cleanouts, or property line sonde locates. Above ground pictures of any sonde locates are to be included in the reports.

3. Locating: Sonde locating is required as part of the tv survey for mains and laterals, to locate any point repairs that are necessary and to locate lateral piping or existing cleanouts from within the main and lateral piping.

4. Video Recordings: The purpose of video recording shall be to supply a visual and audio record of problem areas of the lines that may be replayed. Recording playback shall be at the same speed that it was recorded. Slow motion or stop motion playback features shall be supplied by the contractor. Once recorded, the video and repots become property of the owner. The contractor shall have all video and necessary playback equipment readily accessible for review by the owner during the project.

   Videos displaying poor video quality will be deemed unacceptable and no payments will be made until lines are retelevised and a new video is submitted. Poor quality refers to, but is not limited to, the following: grease or debris on the lens, camera under water, picture too dark, excessive camera speed through the line, lines improperly cleaned, poor/no audio, etc.

5. Audio. All video shall have audio record. As a preamble, at the beginning of the video, the contractor shall state the following: "(Contractor's Name) is performing a pre/post TV survey for Job No._____(provided by the owner)". State date, time, operator's name, area, upstream manhole number to downstream manhole number, pipe size and material, upstream manhole depth, and TV survey will be from up- to downstream, or down- to upstream. The contractor shall verbally state station and position of all laterals and defects. At the end of each line, state: "End of line", upstream manhole number to downstream manhole number, and total linear footage.

3.2 POST CONSTRUCTION SURVEY

A. Procedure

1. The same procedures shall be used as indicated in PRECONSTRUCTION SURVEY.

2. In addition, the contractor shall stop camera at all point repairs, sectional repairs, lateral connection repairs and reinstated laterals, and inspect entire repaired pipe section and all material ends and connections. Close attention is required for the inspection of all overlapping materials, manhole connections and lateral connections.

3. The contractor shall invert white foreground to black as needed in the line section with light background.

4. In the case of a post-liner survey, the contractor shall fully televise the ends of the all liners at the manholes, main/lateral connections and upstream lateral liner ends so that the finished ends of the liner to the host pipe can be evaluated.

B. Documentation

1. The same documentation shall be provided as indicated in PRECONSTRUCTION SURVEY.

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SECTION 02757

POINT REPAIR OF SANITARY SEWER

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The work specified in this Section includes repairs to sections or segments (up to 15 feet) of existing sanitary sewers, mains or service lines, which require excavation from the surface to accurately locate sources of infiltration or inflow and to eliminate them by making necessary repairs.

1.2 GENERAL

A. Methods, procedures and requirements are similar when sections of existing pipe have been crushed, cracked, or settled, or have holes in them and are to be replaced with new pipe. Generally, point repairs are made at specific locations and involve relatively short lengths of sewer or fittings (up to 15 feet) which are to be repaired or replaced. "Isolation" of affected reaches of sewer by plugging and/or bypass pumping, if required, shall be performed as specified in Section 02750 - Wastewater Flow Control.

B. Locations where point repairs are to be made will be made available to the CONTRACTOR through Work Orders and will be based on previously performed smoke tests and television surveys. It is understood that the exact location of pipe leaks and failures cannot always be determined before the pipe is exposed because the smoke injected into the existing pipe to detect their presence can migrate through passages in the earth, and overburden, and may not emerge directly over the leak or failure.

C. It is also understood that the smoke testing and closed circuit television surveys performed by others prior to the commencement of this project cannot always determine the precise cause of leakage or failure. The pipe shall be exposed and the source located, examined and evaluated before repairs are made. Additional smoke shall be introduced into the pipe by the CONTRACTOR to aid in the final evaluation and determination of required work if necessary to locate the area to be repaired.

D. After the designated repairs have been made, the CONTRACTOR will test them as described in this Section of these Specifications. The costs of testing will be borne by the CONTRACTOR. If a repaired joint or section should prove to be defective, the CONTRACTOR shall re-perform the work at no additional cost to the OWNER and shall also be responsible for the costs of any retesting required by the OWNER.

E. Where work is to be performed on private property, the CONTRACTOR shall consult with the OWNER who will make arrangements and schedules with the property owners before the CONTRACTOR performs the work.

F. Excavation, backfill, exploratory excavation, sheeting and shoring, dewatering, conflicts with other utilities, and miscellaneous work shall conform to the requirements of Section 02316 – Excavation and 02315 – Fill and Backfill.

1.3 SUBMITALS

A. The CONTRACTOR shall submit shop drawings in accordance with Section 01300 - Submittals

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe materials are specified in Section 02632-03 – Polyvinyl Chloride (PVC).

PART 3 EXECUTION

3.1 PROCEDURES

A. The point repair procedures shall be as follows:

1. Site preparation shall be performed as described in Division 2. When the repairs are to be made on sewers or facilities lying under paved surfaces, those surfaces shall be removed to the limits specified for point repairs of the particular size pipe involved (trench width plus two feet for concrete surfaces) unless otherwise acceptable to the OWNER.

2. The CONTRACTOR shall excavate and backfill in accordance with Section 02316 – Excavation and Section 02315 – Fill and Backfill. Under no circumstances shall the CONTRACTOR be allowed to remove concrete or asphalt without prior cutting. The saw cutting shall be deep enough to produce an even, straight cut.

3. Dewater, sheet and or brace all excavations in accordance with Section 02316 – Excavation and Section 02315 – Fill and Backfill. Well points, pumps, sheeting, bracing and/or sock drain shall be used to provide a safe, dry, open hole for all repairs or replacements specified herein.

4. Excavate down to the pipe, completely exposing the pipe up to the next undamaged section of pipe on each side.

5. Locate the leak to be repaired.

6. After the leak or failure is located and exposed, CONTRACTOR shall make recommendation and the OWNER will identify the method of rehabilitation. One or a combination of the following methods shall be used:

a. Remove and replace section(s) of pipe or fitting. Remove section(s) of defective pipe or fitting by cutting on each side along lines perpendicular to longitudinal axis of pipe so as to leave "spigot ends" to be connected to replacement pipe. Cut or fabricate replacement section. Make connections using stainless steel shear rings or approved equal. Bedding or embedment shall be placed and compacted. Reconnect to service line if required. As a minimum, a total of six (6) feet of piping shall be replaced by the CONTRACTOR.

In the case of point repairs preformed on service laterals, the CONTRACTOR shall:

(1) Determine the exact location of the repair by means of television inspection with an electronic locating device (sonde).

(2) If roots are encountered inside the lateral being repaired, a minimum of 15 feet of lateral shall be replaced.

(3) If the pipe being replaced reached the private property line, a cleanout shall be installed at that location in both the back yard and front yard easements.

(4) Where the OWNER has indicated a fused-on saddle, sewer service connections shall be joined to the fold-and-formed pipe by means of an electrofusion sewer saddle as manufactured by Central Plastics Company, or approved equal. The installation of the saddle shall be done in accordance with manufacturer's recommended procedures. The outlet shall be gasketed, sized for ASTM D 3034 SDR 35 PVC pipe. The fusion of the saddle base must be achieved by input of 40 volts of current supplied by a micro-processor manufactured by Central Plastics Company, or approved equal.

7. The adequacy of point repairs in sewer mains shall be demonstrated by the CONTRACTOR by testing. Testing of mains and services may be accomplished by one of two alternate methods, depending on the depth of the line and the difference in elevation of the pipe at the ends of the reach. Smoke testing shall be used if the pipe slope exceeds one percent. Testing shall be performed while dewatering is continued and before backfilling.

a. Smoke-Testing. The reach of sewer in which the repair (or repairs) has been made shall be isolated by plugging the upstream and downstream manholes as necessary not only to temporarily eliminate the flow of sewage through it but also to prohibit the smoke from entering other reaches of sewer. Smoke shall then be introduced into one of the manholes and into the reach using smoke bombs and a blower especially designed or adapted for smoke testing sanitary sewers and acceptable to the OWNER. The repaired area shall then be observed for the emergence of smoke for a period of 15 minutes. If none can be seen, the repair

will be deemed to have passed the test.

b. Exfiltration-Testing: This method may be used only on sewers laid on grades less than 1.00 percent. Water, colored with a bright- colored dye acceptable for usage in testing, is introduced into the pipe so as to impose a 2-foot static head over the top of the pipe at the point of repair when the pipe in the lower manhole is plugged. Observations shall then be made by the OWNER to determine if leakage of the colored water occurs at the repair point. Care shall be taken, when this method is used, that:

(1) Not more than 4-feet of static head are induced on the main at the lower end of the reach, and

(2) No back-up problems are caused in service lines.

8. Complete placement and compaction of backfill.

9. Restore surface features to at least as good condition as existed before construction began, including roadways, driveway and walks.

3.2 TELEVISION SURVEY

A. Television survey, including Preconstruction Survey and Post Construction Survey as indicated in Section 02752 – PIPE INSPECTION (MAINS AND LATERALS).

END OF SECTION

SECTION 02759
SANITARY CLEANOUT

PART 1 GENERAL

1.1 SCOPE

A. This Section consists of excavating a section of the existing sewer lateral pipe between mainline and the property line, and furnishing, installing, testing and placing in operation new sewer service cleanout piping, complete in its place, with fittings, and other appurtenances required for a complete installation. This section may include a Double Wye replacement where designated.

B. This Section consists of installing a Vac-a-Tee or approved equivalent on the existing lateral pipe at an approved location to create a clean out with minimal surface restoration.

1.2 GENERAL INFORMATION AND DESCRIPTION

A. The pipe and fittings covered by these specifications shall be furnished by fully qualified manufacturers experienced in the fabrication, casting and manufacture of the pipe materials specified herein. The pipe and fittings shall be designed, fabricated and installed in accordance with the best practice of the trade and the standards specified herein.

B. Portions of existing sanitary sewer service lines shall be excavated to install a cleanout or replace a double wye where approved. Where necessary and directed by the owner, the contractor is to remove test tees, roots, double wye's or defective pipe as required within the area of a cleanout installation. A cleanout installation "area" is to include up to 5' of lateral pipe replacement.

C. Replacement pipe at the property line including cleanout as approved by the owner per owner's minimum standards shall be the same size. Refer to the drawings for the "Standard Cleanout Detail".

D. The contractor may furnish as an alternate to traditional excavation, vacuumed excavation with a snap-on sewer saddle. Vac-A-Tee or approved equal where approved by the owner.

E. The contractor shall submit shop drawings for all materials, couplings, fittings, pipe, clean out boxes, concrete pads or any other item required for the cleanout installation.

F. The contractor shall furnish all labor, tools, materials, and equipment necessary for installation and jointing of the pipe. All piping shall be installed in accordance with the contract documents in a neat workmanlike manner and shall be set for accurate line and elevation. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation, no foreign material is to be allowed to enter the system.

G. The existing laterals shall be hand excavated to a joint, saw cut, clean and square and the appropriate adapter installed to connect the replacement laterals. Care shall be taken to maintain the slopes of the existing laterals.

H. The contractor is to maintain traffic so that it causes minimal disruption to the public. Any road closure or work in the public right of way will require an approval prior to work commencing.

PART 2 PRODUCTS

2.1 PIPE-TO-PIPE CONNECTIONS

A. Pipe-to-pipe connections shall be made by using stainless steel shear rings as manufactured by Fernco, or approved equal.

B. Review the standard cleanout installation drawings for the required materials for construction of a cleanout, surface restoration, cleanout box and pad requirements.

PART 3 EXECTUION

3.1 GENERAL

A. After the site has been located for a particular cleanout installation which is to be installed, operations shall progress generally as follows:

1. Call for locations of existing utilities, Sunshine State One-Call, 811. No excavations are to be done without proper locations.

2. Take photographs of the area prior to the excavation and after the excavation and restoration is completed. The photographs will be used in case there is a discrepancy in the restoration required.

3. Carefully remove or protect surface features in work area. Excavate to completely expose the existing pipe, taking adequate precautions not to disturb any other existing underground facilities and handling excavated materials in a manner that will not cause further restoration.

4. The section or reach of pipe being worked on shall be isolated by plugging and/or by-pass pumping where necessary. There is no payment for bypass pumping for this section of work any bypassing required Is to be include in the bid item for cleanout installation.

5. Remove and dispose of the existing pipe as necessary, no foreign materials are to be backfilled in the trench.

6. The trench bottom shall be over-excavated a minimum of 8-inches and new embedment material to go beneath the pipe placed and shaped so as to form uniform support for the pipe barrel and newly installed cleanout piping.

7. Pipe shall be installed in accordance with the manufacturer's recommendations and to the grade and slope as its existing condition. Pipe shall be installed and jointed, normally beginning at its low or outlet end and proceeding upstream, with the bell ends facing upstream toward the direction of flow. Complete embedment or encasement and place compacted backfill as necessary to avoid pipe settlement during backfilling or compaction. Any pipe connection found to be leaking, offset,

improperly cut or aligned will be re-excavated and replace at no additional charge to the owner.

8. Perform leakage test if requested. When this has been successfully completed and acceptable to the owner, remove temporary plugs and reconnect wyes or tees to service lines.

9. Complete placement and compaction of backfill.

10. Restore surface features to at least as good condition as existed before construction began, including roadways, driveways and walks.

11. Excavated cleanouts, restoration items, sod, asphalt or concrete. These items are limited to a maximum of 5' x 5' restoration area. For excavations deeper than 5-feet the restoration area will increase by 1-foot for each additional foot of excavation depth beyond 6-feet. Payment for restoration items will not exceed the dimensions of the existing item being restored. Actual field measurements will be paid up to the preceding maximum dimensions. The contractor is directed to adjust his restoration items to include the "limits of construction" restrictions, any restoration required outside of these limits will be considered the contractors responsibility unless approved by the owner in writing prior to restoration work.

- END OF SECTION –

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SECTION 02764
CURED-IN-PLACE SECTIONAL PIPE LINING

PART 1 GENERAL

1.1 SCOPE

A. The work specified in this section consists of rehabilitating existing sanitary sewer pipe by installing a resin impregnated fiberglass/polyester felt tube into an existing pipe to restore its structural and hydraulic integrity.

1.2 GENERAL

A. The finished sectional pipe liner in place shall be fabricated from materials which, when installed, will be chemically resistant to withstand internal exposure to domestic sewage.

1.3 SUBMITTALS

A. The Contractor shall submit shop drawings and other information to the OWNER for review in accordance with Section 01300, “Submittals”. Included shall be design calculations for the work.

1.4 QUALIFICATIONS

A. The Qualifications of the CONTRACTOR shall be submitted prior to contract award. These Qualifications shall include detailed descriptions of the following:

1. Name, business address and telephone number of the CONTRACTOR.

2. Name(s) of all supervisory personnel to be directly involved with this project.

3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the OWNER.

4. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the OWNER.

5. The CONTRACTOR (the company bidding, not individuals) shall provide his references of previous project lists going back five years including his customers’ names, addresses, and telephone numbers.

6. To be acceptable, a minimum of 500 sectional liner installations must be documented.

7. To be acceptable, the installer must have had a minimum of five (4) years active experience in the commercial installation of the product.

PART 2 -- PRODUCTS

2.1 GENERAL

A. The finished liner shall be fabricated from material as specified in this section which when cured will be chemically resistant to the corrosive effects of the raw sewage and hydrogen sulfide.

B. The contractor shall submit shop drawings, samples of materials, and design calculations to the OWNER for review.

2.2 LINER SIZING

A. The liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the conduit to be repaired as specified by the OWNER.

B. The length and number of liners shall be that deemed necessary by the OWNER to effectively carry out the repairs. The CONTRACTOR shall verify the lengths in the field before cutting liner to length. The minimum length shall be 6 feet and cover a minimum of 6 inches on either side of the pipe joints.

2.3 LINER MATERIAL

A. The tube will consist of one or more layers of flexible needled felt or an equivalent non-woven material. The tube will be continuous in length exhibiting a uniform minimum wall thickness based upon design calculations found in ASTM F1216 appendix XI. No overlapping sections shall be allowed in the circumference or the length of the liner. The tube will be capable of conforming to offset joints, bells, and disfigured pipe sections.

B. The resin will be polyester, vinyl or epoxy ester with proper catalysts as designed for the specific application:

C. The Sectional liner seal shall be installed with Insigia Seals at the liner end seated on sound pipe so that when compressed there is a compression gasket seal. Insignia Seals or equal must be used, use of hydrophilic paste or caulk will not be permitted.

D. The cured resin material shall have the following properties:

Item	Test Value	Reference Standard
Flexural Strength	4,500 psi	ASTM D 790
Flexural Modulus	250,000 psi	ASTM D 790

2.4 LINER DESIGN

A. The required structural CIPP wall thickness shall be based at a minimum, on the physical properties described above and in accordance with the design equations in the appendix of ASTM F 1216, and the following design parameters:

PROPERTY	TEST METHOD	RESULTS
Flexural Stress	ASTM D-790 (short term)	4,500 psi
Modulus of Elasticity	ASTM D-790	250,000 psi

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design	50 %
Ovality*	2 %
Groundwater Depth = Pipe Depth (above invert)*	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.*	

B. 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. A safety factor of 2 shall be applied in the design calculation. The host pipe shall be considered fully deteriorated. The liner shall be designed to withstand a live load equivalent to two H-20 passing truck plus all pertinent dead loads, hydrostatic pressure and grout pressure (if any). For design purposes, the water table shall be considered at grade elevation. The liner shall be designed in accordance with ASTM F 1216. The buckling analysis shall account for the combination of dead load, live load, hydrostatic pressure and grout pressure (if any). 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.

C. Liner shall be neither accepted nor installed until design calculations are acceptable to the OWNER.

2.5 REFERENCES

A. ASTM F2599 – The Sectional Repair of Damaged Pipe By Means of An Inverted Cured-In-Place Liner.

B. ASTM F1216 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

C. ASTM D-790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

D. ASTM D-792 Standard Test Methods for Density and Specific Gravity of Plastics by displacement.

E. ASTM D-2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

F. ASTM D5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe.

PART 3 EXECUTION

3.1 CLEANING SEWER LINES

A. Prior to any lining of a pipe so designated, it shall be the responsibility of the CONTRACTOR to remove internal deposits from the pipeline in accordance with Section 02751 - Preparatory Cleaning, Root and Tuberculation Removal.

3. 2 TELEVISION SURVEY

A. Television survey shall be performed in accordance with Section 02752 – Pipe Inspection (Mains and Laterals).

B. The interior of the pipeline shall be carefully surveyed to determine the locations and extent of any structural failures. The location of any conditions which may prevent proper installation of lining materials into the pipelines shall be noted so that these conditions can be corrected. A video tape and suitable log shall be kept and turned over to the OWNER.

C. For the sewer line with sectional cured-in-place liner installed, a variance for post-TV and tapes shall be allowed as follows:

1. The post-TV shall commence at the upstream manhole (downstream for reverse setups) and shall proceed at a maximum speed of 30 feet per minute until the repair is reached. No panning of defects or laterals needs to be done. Upon reaching the sectional liner, the CONTRACTOR shall stop and carefully pan the beginning and the end of the liner to show that the repair has been successfully completed. If a lateral connection has been lined over and reopened, the CONTRACTOR shall pan this opening and the lateral. The rest of the line shall be televised without stopping until the downstream manhole has been reached.

2. One log (pre-TV log) shall be furnished with a statement under the comments line as to the linear footage of the beginning of the sectional liner, the length of the liner, and the number of laterals reinstated (if any), and their location.

3.3 FLOW BYPASSING

A. The CONTRACTOR, when required, shall provide for the transfer of flow, through or around a section or sections of pipe that are to be repaired. The proposed bypassing system shall be acceptable in advance by the OWNER. The acceptance of the bypassing system in advance by the OWNER shall in no way relieve the CONTRACTOR of his responsibility and/or public liability. The flow bypassing shall be done in accordance with Section 02750 - Wastewater Flow Control.

Note: If the repair can be made in a few hours, bypass pumping may not be required. The placement carriage shall be equipped with a bypass section to allow flow once liner is pressed into place.

3.4 LINE OBSTRUCTIONS

A. It shall be the responsibility of the CONTRACTOR to clear the line of obstruction. If survey reveals an obstruction that cannot be removed by conventional cleaning equipment, the CONTRACTOR shall make a point repair excavation in accordance with Section 02757 - Point Repair of Sanitary Sewers, to uncover and remove or repair the obstruction. Such excavation shall be accepted in writing by the OWNER prior to the commencement of the work.

3.5 LINER INSTALLATION

A. Prior to liner installation, all active severe leaks which may affect the success of liner installation shall be stopped using chemical grout. The CONTRACTOR shall impregnate the liner. Drop cloths, tarpaulins, and etc. shall be used to prevent material from contacting the adjacent ground. Place the liner on the placement carriage and maneuver carriage and liner into position with the use of a video camera. Force the liner against the inside wall of the damaged host pipe allowing epoxy resin to permeate into any cracks in the host pipe. Allow lines to cure for approximately 2 hours in accordance with the manufacturer's recommendations. Heat may be introduced to speed up curing time. Retract the placement carriage and remove from pipe.

B. After the sectional liner has been cured in place, the CONTRACTOR shall reconnect the service connections if required. Cutting of the liner pipe shall be done from the interior of the pipeline 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. All reinstated service lateral connections (between the liner and the existing pipe) shall be grouted. The reinstatement of the service connections shall be a separate pay item.

3.6 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. There shall be no visible infiltration through the liner or from behind the liner.

3.7 CLEANUP

A. After the liner installation has been completed and accepted, the CONTRACTOR shall clean up the entire project area and return the ground cover to grade. All excess material and debris not incorporated into the permanent installation shall be disposed of by the CONTRACTOR.

3.8 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 years 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.

- END OF SECTION -

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.

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 500,000 linear feet or 2,000 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 250,000 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 250,000 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

2.1 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 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 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 *(as determined by Long-Term tests described in paragraph 2.02.B)*	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). 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.

Property	Test Method	Cured Composite per ASTM F1216
Flexural Modulus of Elasticity	ASTM D-790	250,000 psi
Flexural Stress	ASTM D-790	4,500 psi

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.

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 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 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 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 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 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.

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 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 "Pipe Inspection (Mains and Laterals)", 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 years 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.

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SECTION 02774

WASTEWATER GRAVITY COLLECTION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Construction of sanitary sewers, sewer connections and appurtenances as shown on the Drawings or specified herein.

1.02 QUALITY ASSURANCE

A. Storage: PVC pipe shall be stored on level ground, preferably turf or sand, free of sharp objects which could damage the pipe. Stacking of the PVC pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes. Where necessary, due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

B. Tests: Certified records of tests made by the manufacturer or by a reliable commercial laboratory shall be submitted with each shipment of pipe. All pipe shall be inspected upon delivery and that which does not conform to the requirements of these specifications shall be rejected and must be immediately removed by the Contractor. The Contractor shall furnish and provide samples of pipe for the performance of such additional tests as the City may deem necessary.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01340.

1. Precast manholes
2. Manhole frames, covers, and other castings
3. Chimney seal (existing manhole)
4. Inflow dishes (existing and new manhole)
5. Manufacturer's certified test report on castings
6. Certification of admix installation from pre-caster
7. Certified test records for polyvinyl chloride pipe
8. Mill Test Certificates on ductile iron pipe

9. Manhole pipe connections

10. Coal tar epoxy

11. Special interior linings

B. Record Information: The Contractor shall submit to the City the elevations of the center of the manhole covers and inverts of all pipes in the manholes.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix C "Approved Manufacturer's Listing" appended to these technical specifications.

2.02 MATERIALS

A. Ductile Iron Pipe and Fittings: Ductile iron pipe shall meet the requirements of Section 15062 "Ductile Iron Pipe and Fittings."

B. Polyvinyl Chloride Pipe and Fittings: Polyvinyl Chloride (PVC) Pipe shall meet the requirements of Section 15064 "Polyvinyl Chloride Pipe and Fittings."

C. Precast Concrete Manholes

1. Precast manholes shall conform to the requirements of ASTM Designation C 478.

a. The minimum shell thickness shall be 5-inches.

b. Lifting holes through the structures are not permitted.

c. The design of the structure shall include a precast base of not less than 8-inches in thickness poured monolithically with the bottom section of the manhole walls.

d. Where drop structures are required, the design of the structure shall include a precast base, for the drop structure, of not less than 8-inches in thickness poured monolithically with the bottom section of the manhole walls.

e. New manholes shall contain a crystalline waterproofing concrete admix. Crystalline waterproofing concrete admix shall be added to the concrete during the batching operation. Admix concentration shall be added based upon manufacturer design percent concentration of admixture to the required weight of cement. The amount of cement shall remain the same and not be reduced. A colorant shall be added to verify the admix was added to the concrete for all precast manholes. Colorant shall be added

and provided at the admix manufacturing facility, not at the concrete batch plant. Contractor shall provide certification from the pre-caster that the admix was installed in accordance with the manufacturers recommendations.

2. Top sections shall be eccentric, except that concrete top slab shall be used where shallow cover requires a top section less than 3-feet deep.

3. The existing manhole shall have a new chimney seal installed per City standards and specifications. Approved manufacturers include Cretex, SSI Sealing Systems, or approved equal.

4. The new and existing manhole(s) shall have inflow dishes installed. Inflow dishes shall be made of ABS plastic, have a pressure relief vent and handle color that is visible in the dark (black will not be acceptable). The Contractor shall submit to the City for approval.

D. Concrete and Reinforcing Steel: Concrete and reinforcing steel shall conform to the requirements of Division 3 - Concrete. Concrete classes for the various purposes shall be as follows:

1. Manhole bottoms, Class A

2. Precast manholes, Class A (4,000-psi)

3. Pipe and riser encasement, Class C

4. Protective slabs, Class C

E. Castings: Gray iron castings for manhole frames, covers, adjustment rings, and other items shall conform to the ASTM Designation A 48, Class 30. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects in positions which would impair their strength, or otherwise make them unfit for the service intended. No plugging or filling will be allowed. Lifting or "pick" holes shall be provided, but shall not penetrate the cover. Casting patterns shall conform to those shown or indicated on the Drawings. All manhole frames and covers shall be traffic bearing to meet AASHTO H-20 loadings unless otherwise specified.

F. Brick: Brick for manhole construction shall be dense, hard burned, shale, or clay brick conforming to ASTM Designation C 32, Grade MM or C 62, Grade MW, except that brick absorption shall be between 5 and 25-grams of water absorbed in 1-minute by dried brick, set flat face down, in 1/8-inch of water.

G. Cement Mortar: Cement mortar for manhole construction shall comply with ASTM Designation C 270, Type M, except that the cement shall be Portland Type II only. No mortars that have stood for more than 1-hour shall be used.

H. Pipe Adapter: Connection of PVC gravity sewer lines to precast manholes and wetwells shall be made by using a flexible boot type manhole coupling adapter.

I. Interior Linings (existing structures): Interior surfaces of existing manholes and wetwells shall be coated or lined to resist corrosion where shown on the Drawings. Coatings and linings shall meet the requirements of Section 09901 Coatings and Linings.

J. Interior Linings (proposed structures): Interior surfaces of new wetwells shall be lined. Interior surfaces of new manholes shall be lined where shown on the Drawings. Coatings and linings shall meet the requirements of Section 09901 Coatings and Linings.

K. Joint Sealer: Joint sealer material for precast manhole structures shall be pre-formed flexible plastic conforming to Federal Specification SS-S-00210 (GSA-FSS). Seal all exterior joints with Portland Type II cement after setting of joint sealer and placement of manhole section to form a watertight joint.

L. Non-Shrink Mortar: Non-shrink mortar shall be used for filling annular spaces and holes in precast manholes and wetwells.

M. Manhole Encapsulation: Manhole cones, riser rings, iron frame, cover, and all joints shall be encapsulated with a heat shrink-wrap with a minimum thickness of 98-mils (2.5-mm).

1. Wrap shall have a cross-linked polyolefin backing coated with a protective heat activated adhesive. The wrap shall effectively bond to the substrate via primer provided by the manufacturer. The wrap shall be applied with a high intensity propane torch.

2. Heat shrink-wrap for all barrel section joints of manholes shall be a minimum 9-inch width. Corbel section, riser rings, and ring and cover shall have a minimum 12-inch width wrap.

3. Adhesive tap materials shall not be allowed.

PART 3 - EXECUTION

3.01 PREPARATION

A. Upon satisfactory excavation of the pipe trench, as specified in Division 2 specifications, a continuous trough for the pipe barrel and recesses for the pipe bells shall be excavated by hand digging so that, when the pipe is laid in the trench, true to line and grade, the pipe barrel will receive continuous uniform support and the bell will receive no pressure from the trench bottom.

B. The interior of all pipe shall be thoroughly cleaned of all foreign material before being lowered in the trench and shall be kept clean during laying operations by means of plugs or other approved methods.

3.02 INSTALLATION

A. Sewer Pipe

1. General

   a. Laying of pipe shall proceed upgrade with spigot ends pointing in the direction of flow. Before pipe is joined, gaskets shall be cleaned of all dirt, stones, and other foreign material. The spigot ends of the pipe and/or pipe gaskets shall be lubricated lightly with a lubricant as specified by the pipe manufacturer and approved by the City. Sufficient pressure shall be applied to the pipe so as to properly seat the socket into the bell of the pipe. Any damage to the pipe due to over-exertion shall be replaced at the Contractor's expense. All pipe shall be laid straight, true to the lines and grades shown on the Drawings.

   b. Variance from established line and grade, at any point along the length of the pipe, shall not be greater than 1/32-inch per inch of pipe diameter and not to exceed 1/2-inch, provided that any such variation does not result in a level or reverse sloping invert.

   c. Any pipe, which is disturbed or found to be defective after installation, shall be taken up and relayed or replaced at the Contractor's expense.

   d. Approved utility crossing signs shall be placed on the pipe alignment at each side of any waterway crossing.

2. PVC Pipe

   a. Handling PVC pipe: The handling of PVC pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Sections of pipe with deep cuts and gouges shall be removed and discarded at no expense to the City.

   b. Lowering pipe into trench: Care shall be exercised when lowering pipe into the trench to prevent damage to or twisting of the pipe.

   c. Building Laterals/Service Connections

   d. Service connections shall be constructed in accordance with the details as indicated on the Drawings.

   e. Sewer lateral pipe shall be extended to the right-of-way and plugged at the right-of-way line to avoid leakage (unless otherwise indicated on the Drawings). All connections and changes of direction shall be made using standard fittings designed for that purpose.

   f. Locator balls shall be placed under all sanitary sewer service cleanouts.

   g. On curbed streets, the exact location for each service connection shall be marked by etching or cutting an "S" in the concrete curb. Where no curb exists or is planned, locations shall be marked by a method approved by the City.

3. PVC C-900 DR 14 Pipe Section: PVC C-900 DR 14 pipe shall be substituted for the specified PVC pipe where:

   a. The sewer or service pipe is to be constructed with less than 30-inches of cover between the top of the pipe and the final top of pavement or ground line.

   b. The PVC sewer main crosses over a water main, or is at a depth which results in less than 18-inches clear distance between pipes when crossing under a water main. The DR 14 pipe shall extend a minimum of 10-feet on each side of the point of crossing.

   c. The lateral separation of the sewer pipe and potable water piping is less than 10-feet.

B. Manholes:

1. Manhole excavation and bedding at manhole junctions shall be performed in accordance with the provisions of Division 2 of these specifications.

2. The invert channels shall be smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section using 2,500-psi concrete. Steep slopes outside the invert channels shall be avoided. Changes in size and grade shall be made gradually and evenly. Changes in the direction of the sewer or entering branch shall be a smooth curve with radius as long as practicable. Invert channels shall also be formed for pipe stubouts.

3. The first pipe joint outside the manhole shall be located a minimum distance of 24-inches from the outside surface of the manhole.

4. Precast manhole tops shall terminate at such elevations to permit laying brick courses under the manhole frame to make allowance for future street grade adjustments.

5. Frames and covers shall be set accurately to conform to the finished grade.

6. Outside drop connections shall be made in accordance with the details shown on the Drawings.

7. Drop connection base slab extensions on precast manholes shall be manufactured monolithically with the manhole elements at the casting yard. The manufacturer shall submit for approval the method of drop manhole construction.

8. Where additional pipe connections or modifications of existing factory made openings are required on new or existing precast concrete manholes or wetwells, all cutting relative thereto shall be performed only by a power driven abrasive wheel or saw. It is specifically noted that such connections to existing manholes or wetwells shall be installed in accordance with the details for new units shown on the Drawings, and shall be caulked watertight with non-shrink grout.

9. Connection of the pipe entering the manhole shall be made by using a flexible boot type manhole coupling adapter. At the entry into the manhole, no part of the horizontal pipe shall rest against the concrete.

10. Manholes shall be completed as the work progresses so that testing may be conducted as prescribed in paragraph 3.03 Field Quality Control.

C. Concrete encasement: Class C concrete encasement shall be constructed in accordance with details shown on the Drawings.

1. The City may order the line encased when:

a. The sewer main crosses over a water main, or is at a depth which results in less than 18-inches clear distance between pipes when crossing under a water main. Encasement shall extend a minimum of 10-feet on each side of the point of crossing. In lieu of encasement, the sewer line may be constructed of PVC DR 14 pipe and shall be laid such that both joints will be a distance of 10-feet from the crossing.

b. The maximum width for trench excavations is exceeded. The Contractor shall construct concrete encasement around the pipe for the length of the excessive excavation. No payment will be made for the concrete encasement required due to excessive trench widths.

2. The points of beginning and ending of pipe encasement shall be not more than 6-inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.

D. Concrete protective slabs: Concrete protective slabs as shown on the Drawings shall be constructed over gravity sewers that have less than 3-feet of cover from finished grade.

E. Connections to existing structures: Proposed sewer lines shall be connected to the existing manholes by core drilling the proper size opening and installing a flexible boot type manhole adapter as specified in paragraph 2.01.H of this Section.

F. Invert channels (benching) shall be provided for all new manholes and existing manholes which are connected into. No brick shall be allowed in construction of the manhole invert. Inverts shall be poured using 2,500-psi concrete. Contractor is to remove all existing benching and to construct new benches such that they contain both the existing and new flow channels.

3.03 FIELD QUALITY CONTROL

A. Workmanship: Sewers and appurtenances shall be built watertight. The sewage must be pumped for disposal and special care and attention must be paid to securing watertight construction. Upon completion, the sewers, or sections thereof, will be tested and gauged and if leakage is above the allowable limits specified, the sewer will be rejected.

B. Inspection: On completion of each block or section of sewer, or such other times as the City may direct, the block or section of sewer shall be cleaned, tested, and inspected.

1. Each section of the sewer shall show, on examination from either end, a full circle of light between manholes.

2. Each manhole or other appurtenance to the system shall be of the specified size and form, be watertight (no leakage allowed by visual inspection), and be constructed with the top set permanently to specified position and grade. All repairs shown necessary by the inspection shall be made; broken or cracked pipe replaced; all deposits removed and the sewer left true to line and grade, entirely clean and ready for use.

3. No pipe shall exceed a deflection of 5%. After the final backfill has been in place at least 30-days, the Contractor shall perform deflection testing using a rigid ball or mandrel with a diameter of not less than 95% of the base inside diameter or average inside diameter of the pipe, depending which is specified in the ASTM standard to which the pipe is manufactured. If the mandrel does not pass the completed section of sewer, the entire section of sewer will be rejected.

C. Closed Circuit Television Inspection:

1. Internal gravity sewer video inspection shall be performed by the Contractor to check for alignment and deflection. The television inspection shall also be used to check for cracked, broken, or otherwise defective pipe and overall pipe integrity.

2. The video internal inspection will be performed in 2 stages. The first inspection shall be within 30-days after the installation of the gravity sewer pipe provided the road base is in place and the manhole rings and covers are to grade. The second inspection of the gravity sewer pipe shall be before the end of the 1-year warranty period.

3. If the first or second video inspection reveals cracked, broken, or defective pipe, or pipe misalignment resulting in vertical sags in excess of 1-1/2-inch or a ring defection in excess of 5%, the Contractor shall be required to repair or replace the pipeline. Successful passage of both the low-pressure air exfiltration test and video inspection is required before acceptance by the City.

4. Prior to repair or replacement of failed sewer pipe, the method of repair or replacement shall be submitted to the City for approval. Pressure grouting of pipe or manholes shall not be considered as an acceptable method of repair.

D. Low Pressure Air Exfiltration Testing:

1. The Contractor shall provide all labor, equipment, and materials and shall conduct all testing required under the direction of the City

2. Low pressure air testing shall conform to the requirements of UNI-B6-79 "Recommend Practice for Low-Pressure Air Testing of Installed Sewer Pipe", as published by UNI-Bell Plastic Pipe Association.

3. During sewer Construction, all service laterals, stubs, and fittings into the sewer test section shall be properly capped or plugged so as not to allow for air loss that could cause an erroneous air test result. Where necessary, the Contractor shall restrain caps, plugs, or short pipe lengths such that blowouts are prevented.

4. Each test section shall not exceed 400-feet in length and shall be tested between adjacent manholes.

5. Before testing, Contractor shall install monitoring wells at each manhole to determine groundwater level and adjust test pressure accordingly. In no case shall the test pressure exceed 9.0-psig. All pressurizing equipment shall include a regulator or relief valve set no higher than 9.0-psig to avoid over-pressurizing.

6. Low-pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0-psig greater than the average backpressure of any groundwater above the invert of the pipe, but not greater than 9.0-psig.

7. When temperatures have been equalized and pressure stabilized at 4.0-psig greater than the average groundwater backpressure, the air hose from the control panel to the air supply shall be shut off or disconnected. The continuous monitoring pressure gauge shall then be observed while the pressure is decreased to no less than 3.5-psig greater than the average groundwater backpressure. At a reading of 3.5-psig greater than the average groundwater backpressure, timing shall commence with a stopwatch or other timing device that is at least 99.8% accurate.

8. If the time shown in the table, for the designated pipe size and length, elapses before the air pressure drops 1-psig; the section under-going test shall have passed. The test may be discontinued once the prescribed time has elapsed.

9. If the pressure drops 1-psig before the appropriate time shown in the table has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test.

10. Should the section fail to meet test requirements, the Contractor shall determine the source or sources of leakage, and make all necessary repairs and shall repeat the test until the test section is within established limits. All corrective work shall be at the Contractor's expense.

E. Correction of Non-Conforming work:

1. All non-conforming work shall be repaired or replaced by the Contractor at no additional expense to the City. Non-conforming work shall be defined as failure to adhere to any specified or implied directive of these technical special provisions and/or the Drawings, including but not limited to pipe not laid straight, true to the

lines and grades as shown on the Drawings, damaged or unacceptable materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling, water standing in any pipe segment or structure, visible or detectable leakage, and failure to pass any specified test or inspection.

Table 02774-1
Test Time Table

TEST TIME: For sewer diameter between 8 inches and 36 inches inclusive, the pipe shall be tested between adjacent manholes. The test time for the air pressure to drop the specified one pound shall be as listed below:											
SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP											
1 Pipe Dia. (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Feet							
				100	150	200	250	300	350	400	450
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.148 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:26	71:13	89:02	106:50	124:38	142:26	160:15
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

END OF SECTION

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SECTION 02930

SODDING

PART 1 - GENERAL

1.01 SCOPE

A. Provide all labor, materials and equipment necessary for complete sodding of areas affected by construction. This shall include, but not be limited to: liming, fertilizing, sodding, necessary barriers, tests and all incidentals to make the work complete.

1.02 WORK INCLUDED

A. Testing of topsoil.

B. Raking and leveling topsoil as required for sodding.

C. Liming and fertilizing of topsoil.

D. Laying and rolling of sod.

E. Maintaining

1.03 SUBMITTALS

A. Submit product source and information sheets in accordance with Section 01340.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fertilizer

1. Fertilizer shall be commercial fertilizer, as manufactured by International Chemical Company or equal.

2. Said fertilizer shall have a 10-20-6 N.P.K. content and contain a minimum of 60% of organic material or as otherwise approvable to the City.

3. It shall be delivered at the site in the original sealed containers.

B. Sod

1. Sod from right-of-way swales within the work area shall be Bahia sod or replaced in-kind, whichever is finer quality.

2. Sod shall be first quality Bahia sod of firm texture having a compacted growth and good root development.

3. Sod shall be absolutely true to varietal type, live, fresh and free from weeds or objectionable vegetation, fungus, insects and disease of any kind. Sod shall be kept moist from the time it is field cut until it is laid at the proposed site.

4. The sod shall be as grown by a certified turf nursery and Contractor shall inform Engineer as to the source of the sod to be utilized prior to ordering and delivery of sod.

5. Sod shall be furnished and installed in rectangular sod strips measuring 12 to 16-inches in width of standard lengths of not less than 2 feet and delivered on pallets.

PART 3 - EXECUTION

3.01 INSTALLATION

A. These areas shall be fine graded to achieve the finished subgrade after compaction which shall be obtained by rolling, dragging or by an approved method which obtains an equivalent compaction to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. All depressions caused by settlement or rolling shall be filled with additional existing or furnished topsoil and regraded and prepared as specified above until it presents a reasonably smooth and even finish at the required sod sub-grade.

B. All sod furnished shall be living sod containing at least 70% of thickly matter grasses as specified and free from noxious weeds. All sod shall be certified free of fire ants.

C. No broken pads or torn or uneven ends will be accepted. Standard size sections of sod shall be strong enough to support own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10% of the section. Sod shall not be harvested when its moisture content (excessively wet or dry) may adversely affect its survival.

D. Sod shall be harvested, delivered, and installed within a period of 24 hours. Sod not installed within this time period shall be subject to inspection and rejection by Engineer, and shall be removed from the site and a fresh sod supply shall be furnished at no extra cost to City.

E. The topsoil shall not be moist at time of installation; however, it shall contain sufficient moisture so as not be powdery or dusty, both as determined by the supplier's representative.

F. The overlapping of existing lawn with new sod along limit of work lines will not be permitted. Sod shall be laid in strips, edge to edge, with the lateral joints staggered. All minor or unavoidable openings in the sod shall be closed with sod plugs or with topsoil, as directed by Engineer. However, sod laid with joints determined to be too large shall be lifted and re-laid as specified herein at no extra cost to City.

G. Immediately after the sod is laid, the sod shall be watered thoroughly by hand or mechanical sprinkling until the sod and at least 2-inch of the top soil bed have been thoroughly moistened.

H. Contractor shall be responsible to furnish his own supply of water to the site at no extra cost. If possible, City shall furnish Contractor, upon request, with a source and supply of water. Contractor shall apply for temporary meter and pay City for water used at current utility billing rates. However, if City’s water supply is not available or not functioning, Contractor shall be responsible to furnish adequate supplies at his own cost. All work injured or damaged due to the lack of, or the use of too much water, shall be Contractor's responsibility to correct.

3.02 MAINTENANCE

A. Maintain the entire sodded areas at least a 30-day period or until final acceptance at the completion of the Contract, whichever is longer. Maintenance shall include watering as specified, weeding and removal of stones which may appear. All bare or dead spots which become apparent shall be properly prepared, limed and fertilized, and resodded at Contractor's expense as many times as necessary to secure a good growth. In the event that the sod installation is not accepted by Engineer, the entire area shall be maintained and cut by Contractor until final acceptance of the sod installation.

B. Take whatever measures are necessary to protect the sod while it is developing. These measures shall include furnishing of warning signs, barriers, or any other necessary measures of protection.

END OF SECTION

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SECTION 02958

IET COATING SYSTEM

PART 1 - GENERAL

1.01 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

2.01 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% solids, 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

3.01 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.

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

SECTION 03300

CAST-IN-PLACE CONCRETE, REINFORCING AND FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Provide all labor, materials, equipment, fabrication, incidentals, transportation, placing and supervision necessary to complete all cast-in-place concrete work, its finishing, and all related work called for by the Contract Drawings and/or Specifications, or reasonably inferable from either or both, as needed for a complete and proper installation.

B. Related work: Work affecting this Section includes, but is not limited to:

1. Shop Drawings-Per General Conditions and as specified herein.
2. Materials and storage thereof.
3. Reinforcing-Bar and fabric.
4. Accessories of every nature, including form tie system.
5. Formwork and removal thereof, including shoring and reshoring.
6. Concrete proportions and mixes.
7. Placing of concrete.
8. Admixtures.
9. Joints, metal joint screeds and joint fillers.
10. Finishes of all types.
11. Protection and curing.
12. Patching.
13. Laboratory Testing.

1.02 QUALITY ASSURANCE

A. Unless otherwise indicated, all materials, workmanship and practices shall conform to the requirements of ACI 301-96 "Specifications for Structural Concrete for Buildings", except as modified by supplemental requirements hereinafter.

1.03 STANDARDS

A. ACI 301-96 Specifications for Structural Concrete

B. ACI 318-95 Building Code Requirements for Reinforced Concrete

C. Florida Building Code, latest edition.

D. ACI 117-90 Standard Specifications for Tolerances for Concrete Construction and Materials

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials for Concrete:

1. Cement shall conform to the following: Portland Cement ASTM C150, normal, type I or type II. Provide domestic cement of one type and from same source for entire project.

2. Mineral Admixtures:

(a) Fly Ash: Shall conform to ASTM C 618, with 20% maximum of total cementitious weight.

(b) Ground Blast Furnace Slag: Shall conform to ASTM C 989-93. 30% maximum of total cementitious weight.

3. Chemical Admixtures: The following admixtures are permitted, but require written approval from the Engineer:

(a) Air Entraining Admixture: Comply with ASTM C260. "Specifications for Air-Entraining Admixtures for Concrete.

(b) Water Reducing Admixture: Comply with ASTM C494 "Specifications for Chemical Admixtures for Concrete", Type A, and compatible with air entraining admixture.

(c) Water Reducing and Retarding Admixture: Comply with ASTM C494, "Specifications for Chemical Admixtures for Concrete, Type D, and compatible with air entraining admixture.

(d) High Range Water Reducing Admixture: Comply with ASTM C494, "Specifications for Chemical Admixtures for Concrete", Type F or G, and compatible with air entraining admixture (Including superplasticizer to reduce water content.)

(e) Admixtures containing added calcium chloride are not permitted.

4. Aggregates: Shall conform to ASTM C 33 and shall be quarried/mined in fresh water. Aggregates from salt water or brackish water are not permitted. Coarse aggregate size shall not exceed:

Concrete Member	Size	
Walls	3/4"	67#
Beams or structural slabs not on ground	3/4"	67#
Columns and all other concrete	1"	57#
Drilling concrete pad or slabs on ground	1"	57#

5. In sanitary sewage applications, where called for in the plans and/or specifications an antimicrobial admixture as specified below shall be utilized:

(a) An antimicrobial agent, Con^{mic}Shield®, or approved equal, shall be used to render the concrete uninhabitable for bacteria growth.

(b) Contractor shall mix the liquid antimicrobial additive with the total water content of the concrete mix design in a proportion of 1 gallon per cubic yard. In the case of repairs to damaged concrete a proportion of 2 gallons per cubic yard shall be utilized.

(c) In some instances all of the concrete in the structure in will receive the additive and in other instances only a portion of the concrete will receive the additive. Hence, the Contractor shall apply the additive only as directed in the specific instance.

(d) Contractor shall submit a letter of certification to the City, stating that the correct amount and correct mixing procedure was followed for all antimicrobial concrete.

(e) Con^{mic}Shield® antimicrobial additive shall be as manufactured by Con^{mic}Shield® Technologies, Inc. 541 - 10th Street NW, #233, Atlanta, GA 30318. Phone: (877)543-2094.

B. Portland cement and reinforcing steel: Comply with ACI 301-96 and, with all modifications and supplements thereto listed in Part 3 of this specification.

C. Burlap mats: Conform to AASHTO Specification M182. (Burleen non-staining mats.)

D. Epoxy bonding agent: A two (2) component, solvent free, moisture insensitive structural epoxy adhesive conforming to ASTM C881-90 Type II, Sikadur 32 Hi-Mod, as manufactured by Sika Corp., Concresive 1090 Liquid by Master Builders or approved equal.

E. Anchor bolts, clamps, nuts and washers: 316SS.

F. Dovetail slots: Galvanized steel, 22 gauge, 1"x 1", with 5/8" throat, fiber filled.

G. Forms:

1. Plywood Forms: PS-1, B-B Concrete Form, Class I, exterior type, mill oiled and edge sealed. Thickness shall be as required to support concrete at the rate placed, but not less than 3/4".

2. Steel Forms: Uncoated steel, 3/16"-inch minimum thickness, fabricated to close tolerances, protected only by the specified release agent, braced so as not to dent, bend or dimple under wet concrete loads, vibrator impact and tool impact. Maintain steel forms in rust free condition by use of steel wool and light grinding, followed by coats of the specified release agent. Forms should be adjustable to be brought into true alignment without steps or ridges.

H. Form release agent:

1. For plywood forms use a natural non-petroleum base, non-staining and non-retarding release agent that will effectively prevent absorption of moisture and prevent bond with concrete, and leaves the concrete with a paintable surface.

2. For steel forms, use an approved material that will not stain, color or otherwise affect the finish of the concrete. Form coating shall not be detectable on finished surfaces.

3. Round column forms: Provide seamless fiber forms with the three plies nearest to the interior surface of the form deckled or scarfed and overlapped to minimize spiral gaps or seams on the column surface.

I. Form Ties: Steel rod type with integral waterstops and cones, and with ends or end fasteners that can be removed without spalling the concrete and which leave a hole equal in depth to the required reinforcement clearance, but not less than 2 inches from the formed face of the concrete. Wire tie, banding wire and wood spreaders will not be permitted.

J. Form Inserts:

1. Bevel or chamfer strips: Wood or non-staining plastic, 3/4" wide on each leg at exposed edges of concrete members, unless otherwise noted on plans.

2. Tongue and Groove Joint Forms: Minimum 24 gauge with steel stakes and splice plates. Forms shall be designed for joints not to receive a poured seal.

3. Pipe hangers and other utility supports: AISI Type 316 stainless steel.

K. Non-Shrink Grout: Non-shrink, non-metallic grout conforming to ASTM C 1107 Grade B or Grade C only. Grout must meet ASTM C 1107 at a temperature range of 50 F to 90 F at a flowable consistency.

L. Grout for Surface Repair and Bond Coat:

1. For repair, one part Portland cement to two parts fine sand, and a 50% of water and 50% Acryl 60 or equal (Thoroseal or Acryl Set Bonding Agent by Master Builders) to produce a stiff mortar.

2. For bond coat, one part Portland cement to one part sand, and a 50% of water and 50% Acryl 60 or equal (Thoroseal or Acryl Set Bonding Agent) to produce a slurry mix.

M. Moisture Barrier: Kraft paper and glass reinforcing fibers sandwiched between 2 layers of polyethylene film with a permeance rating of maximum 0.1 as per ASTM E-96, Procedure A.

N. Preformed Expansion Joint Filler: Non-extruding type, self-expanding cork, 3/4", 1", and 1½" cork (not to be used for sidewalks), conforming to plans or as otherwise noted on drawings, conforming to the requirements of ASTM D1752, Type II, and compatible with joint sealant compound.

O. Joint Sealant Compound: Non-sag, 2 component, solvent free, moisture insensitive, flexible, epoxy resin conforming to the requirements ASTM C920-87 Type M, Grade NS. Additionally, the sealant must be recommended by the manufacturer to perform under continuous immersion in water.

P. Polyurethane Elastomeric Sealant: Sikaflex-2c, NS/SL or approved equal. Provide a 2-component, premium-grade, polyurethane-based, elastomeric sealant.

It is principally a chemical cure in a non-sag and self-leveling consistency. Sealant shall meet ASTM C-920 and Federal Specifications TT-S-00227E.

1. Joint Movement: +50%.

Q. Waterstops:

1. Volclay Waterstop-RX or approved equal. Flexible strip of bentonite waterproofing compound in coiled form.

   (a) Chemical Composition:

      (1) Butyl Rubber-Hydrocarbon: 24.9% by weight; ASTM D-297.
      (2) Bentonite: 75 % by weight; SS-S-210-A.
      (3) Volatile Matter: Below 1 %; ASTM D-6.
      (4) Waterstop shall not contain any asbestos fibers or asphaltics.

   (b) Physical Properties:

      (1) Specific Gravity: 1.57; ASTM D-71.
      (2) Application Temperature Range: 5-125 F.
      (3) Flash Point: 365; ASTM D 93-97.
      (4) Accelerated Aging: Maintained 99% solids.
      (5) Dimensions: 1" x 3/4" x 16'-6"

2. Polyvinyl chloride (PVC): Conforming to the requirements of U.S. Army Corps of Engineers Specification CRD-C-572 and of the following type:

   (a) Expansion Joints: 9-inches by 3/8-inch, ribbed center bulb.

   (b) Construction Joint: 9-inches by 3/8-inch, flat ribbed.

   (c) Only where specified on Plans at construction and expansion joints: 9-inches by 3/8-inch, split ribbed.

   (d) Install waterstops as shown as manufactured structures.

R. Fiber Reinforcement: Fiber reinforcement shall not be used in the concrete unless ordered by the Engineer in writing. It shall consist of 100% virgin polypropylene fibrillated fiber-dosage of 2 lbs. per cubic foot.

1. Compressive Strength: 1 psi (.006895 M Pa), ASTM C-39.

2. Flexural Strength: 288 psi (2.0 M Pa) after 7 days, 390 psi (2.7 M Pa) after 28 days; ASTM C-78.

3. Splitting Tensile Strength: 194 psi (1.3 M Pa) after 7 days, and 290 psi (2.0 M Pa) after 28 days; ASTM C-496.

4. Source: Fibermesh Micro-Reinforcement System by Fibermesh Company, Division of Synthetic Industries, Inc., or approved equal.

S. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

T. A shrinkage reducing admixture (Teraguard) or equivalent at the rate of 2.2% by weight of cement may be used in the concrete to meet the shrinkage limitations.

U. To protect the concrete slab against the elements, the Engineer may direct the Contractor to spray an evaporation retarder on the finished concrete slab immediately behind the cement finishing process at no additional cost to the City. This is not a curing compound.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work.

3.02 SUPPLEMENTAL REQUIREMENTS

A. All phases of concrete construction, including materials formwork, and all other related procedures shall comply with the most stringent allowed tolerances of ACI-301 and ACI-117 Standards (Latest Edition) – Non-compliance with these standards will cause full rejection of any work done.

B. Comply with ACI 301-96 and with all modifications and supplements thereto listed herein. In addition to the ACI Standards on finished concrete, the Engineer will only approve quality finished concrete which in his opinion is ready to receive a grout finish, paint or liquid membrane.

C. The following modifications and supplements to ACI 301-96 shall also apply to the work.

1. General

(a) These specifications cover cast-in-place structural concrete for use in buildings and appurtenances, including foundations, curbs, sidewalks, concrete pavements and utility structures, water containment tanks, and piles.

(b) Keep minimum two (2) copies of ACI 301-96 "Specifications for Structural Concrete" in field office at all times.

2. Proportioning and Design of Mixes:

(a) General: Proportion concrete to meet properties as specified. Prepare mix designs for each type and strength of concrete. Submit with mix design the chemical admixture manufacturer's statement that the admixture proposed complies with the requirements of this specification. Where concrete of different strengths are specified for the same location, the higher strength concrete shall be used. Concrete proportions shall be established on the basis of previous field experience, or laboratory trial batches as specified in ACI 301-96 Sections 4.2.2 & 4.2.3.

(b) Classes of Concrete:

(1) Structural concrete of normal weight for portions of the structure that are required to be watertight containments or tremie concrete, the water/cementitious ratio shall not exceed 0.45 if exposure is to be to fresh water.

(2) If the concrete is exposed to salt or brackish water, or if exposed to injurious concentrations of sulfate-containing solutions (1500 ppm or more of Sulfate in water) or other chemically aggressive solutions, use Type II cement with Rheobuild 1000 admixture by Master Builders, or approved equal; water/cementitious ratio shall not exceed 0.34.

(3) Other Concrete: (This would be slabs-on-grade, concrete thrust blocks, and miscellaneous concrete). The water cementitious ratio shall not exceed 0.50 to 0.55.

(4) Minimum f'c @ 28 days shall be 4000 KSI with a Water/Cement ratio of 0.45.

(5) Minimum f'c @ 28 days shall be 7000 KSI with a Water/Cement ratio of 0.34.

(c) Slumps:

(1) All structural concrete, pumped concrete and tremie concrete shall contain a High Range Water Reducing Admixture and be designed with a maximum water content of 270 pounds per cubic yard. The initial water slump prior to addition of the High Range Water Reducing Admixture shall be 2-inch maximum. Concrete at point of placement shall not exceed 10-inches. Concrete shall be non-segregating.

(2) Slabs including slabs-on-grade, and all other concrete shall have a maximum water content of 287 pounds per cubic yard and have a 5-inch

maximum slump with a water reducer, or water reducer and retarder admixture added.

3. Formwork

(a) Earth cuts are not permitted for forms for vertical surfaces. Footings, grade beams and slab edges shall be formed. Provide moisture barrier under all slabs on grade. Lap 6-inches and tape punctures.

(b) The contractor is responsible for the adequacy of forms and shoring including placing, fill and equipment on roof, and for safe practice in their use and removal. Submit formwork calculations, and shop drawings including shoring and reshoring. In addition, the calculations and shop drawings for formwork, shoring, and reshoring, if required by the Engineer or Building City, shall be signed and sealed by a Professional Engineer registered in the State of Florida.

(c) Design forms for the loads and lateral pressures resulting from the placement and vibration of concrete and for design considerations, wind loads, allowable stresses, and other applicable requirements of the South Florida Building Code.

(d) Provide form facing materials as required by the specified finish of the formed surface. Do not use facing material with raised grain, torn surfaces, worn edges, patches, dents or other defects. No form may be reused more than three times without the City's approval. The maximum deflection permitted of facing materials reflected in concrete surfaces exposed to view is 1/240 of the span between structural members.

(1) Forms shall be free from surface defects, tight to prevent leakage and braced to keep its position and shape when filled with concrete. Adjacent edges and end panels and sections shall be held together to provide accurate alignment and prevent forming ridges, fins, offsets or similar type defects in finished concrete. It shall be tight to prevent loss of water, cement or fines during placing and vibrating concrete. The bottom of the forms placed in continuous straight even footings or slabs shall be watertight to prevent loss of water, cement and fines during placement and vibration of concrete, a gasket may be required by the Engineer under the forms to provide water tightness at the Contractor expense. The Contractor shall not proceed to place forms for concrete work adjacent to or on top of previous placed concrete without the Engineer's approval, if the stripped forms reveals columns, walls or beams are out of level or plumb or there are cold joints or other objectionable work in the opinion of the Engineer. Contractor shall submit to the Engineer for approval, how he intends to correct or remove the defective work promptly at

his expense. Contractor shall perform such corrections prior to proceeding to place concrete in the next Section.

(e) Provide positive means of adjustment (wedges or jacks) of shores and struts, and all settlement shall be taken up during concrete placing operation. Brace forms securely against lateral deflection. Do not anchor form bracing to poured concrete floors, or make holes in floor.

(f) Provide temporary openings in columns and wall forms to limit the free fall of concrete to five (5) feet. Place such openings at no more than eight (8) feet apart to facilitate placing and consolidation of concrete. Elephant trunks may be used to vertical heights of fifteen (15) feet for tremie and other purposes, if approved by the Engineer. Provide temporary openings at the bottom of wall and column forms and elsewhere as necessary to facilitate cleaning and observation immediately before concrete is placed. Blow formwork entirely clean of all saw dust, dirt, or other items not specifically intended to be a part of the final concrete. Any evidence of non-intended items in the forms is considered sufficient cause to stop concreting operation and/or require removal of concrete placed in such contaminated forms.

(g) Provide inserts, conduits, boxes, sleeves, anchors, ties, bolts, hangers, dowels, thimbles, nailers, grounds and other devices in coordination with other trades.

(h) Set anchor bolts and other embedded items accurately and hold securely until concrete is placed and set. Anchor bolts shall be galvanized and of size and length as indicated on the Contract Drawings. Bolts not sized shall be 3/4-inch diameter.

(i) Insert galvanized dovetail anchor slot in forms, in columns, beams and slabs completely around in-fill masonry panels.

(j) Install wall spools, wall flanges and wall anchors before placing concrete. Do not weld, tie or otherwise connect the wall spools to the reinforcing steel.

(k) Do not use pinch bars, wrecking bars or other metal tools against as-cast concrete to wedge forms loose; use only wooden wedges carefully and gradually. Driving shall be accomplished by light tapping.

(l) The Contractor is responsible for the removal of forms and shores. Do not remove forms or shores before the member has attained sufficient strength to support its weight and the loads imposed, nor sooner than listed below

(1) Wall forms: 24 hours

(2) Column forms: 24 hours.

(3) Beam and girder side forms only (not bottom form): 24 hours.

(4) Beam and Girder bottom forms: 7 days minimum unless otherwise approved by the Engineer.

(5) Slab forms: 14 days.

(6) Arch centers: 7 days.

(7) Pan joist forms: 4 days.

4. Reinforcement

(a) Prior to fabrication, submit for review shop drawings showing all fabrication dimensions, bar lists and location for placing of the reinforcing steel and accessories, including spacing of reinforcing, splices (lap, welded, Cadweld and/or mechanically threaded), grade of reinforcing and name of manufacturer. Note all deviations from the Contract Drawings and use the same designation mark as shown on the Contract Drawings where possible.

(b) Reinforcing bars: ASTM A615, Grade 60, deformed bars of USA manufacturer.

(c) Welded wire fabric: ASTM A185, galvanized.

(d) Metal bar supports: CRSI MSP-1, Chapter 3, Class 2, Type B stainless steel protected bar supports.

(e) Coupler Splice Devices: Cadweld, tension couplers capable of developing the ultimate strength of the bar.

(f) Reinforcing steel upon which unauthorized welding has been done; removal and replacement no additional cost to the City.

(g) Place reinforcing bars to the most stringent tolerances indicated in ACI 301 and ACI 117 (Latest Edition). Tolerances specified in those standards shall govern over any other reference code or standard.

(h) All reinforcement at time concrete is placed shall be free of mud, oil or other materials that may affect or reduce the bond. Reinforcing with rust or mill scale will not be accepted without cleaning and/or brushing to remove scale and rust.

(i) Support rebar and mesh reinforcing for slabs on grade 1½ inches from top of slab on masonry blocks not less than 4 sq. in., having a compressive strength equal to or greater than the specified strength of the concrete being placed. Space

blocks at no more than 4 feet apart each way for rebars, and no more than 3 feet apart for mesh reinforcement.

(j) Support reinforcing off from formwork for columns, walls and beams with stainless steel protected bar supports. Support slab reinforcing on #5 bars, or larger, spaced at no more than 48 inches on center. Space individual high chairs no more than 48 inches apart and support bars shall not exceed 24 inches past outermost chairs.

(k) Overlap welded wire fabric in such a manner that the overlap measured between outermost cross wires of each fabric sheet is not less than the spacing of the cross wires plus 2 inches or 6 inches, whichever is greater. Do not extend fabric through expansion and/or contraction joints, unless otherwise noted on the Contract Drawings.

(l) The minimum clear distance between parallel bars, both vertical and horizontally, shall not be less than the nominal diameter of the bars, or less than 1½ times the maximum size of the aggregate, or 1-inch in beams, or 1½ inches in columns, whichever is greater. Where reinforcement in beams is placed in two or more layers, the upper layer shall be placed directly above the bars in the bottom layer. Misplacement, misalignment or improper length of dowels shall be sufficient cause to require removal and reconstruction of affected work.

(m) Unless allowed by the Engineer, bending of reinforcing partially embedded in concrete is not permitted. When permitted, bending shall be in accordance with CRSI Manual of Standard Practice.

5. Joints and Embedded Items.

(a) Provide premolded expansion joint filler strips of proper width and length as specified in the Contract Drawings. Place ½" expansion joint fillers every 20 feet in straight runs of walkways or sidewalks, at right angle turns and wherever concrete butts into vertical surfaces, unless otherwise noted on the Contract Drawings.

(b) Provide waterstops in all construction joints, unless otherwise indicated on the Contract Drawings.

(c) Join all waterstops at all intersections so that a continuous seal is provided. Center the waterstop in the joint. Hold water stop positively in correct position. In the event of damage to the waterstop, repair the water stop in an acceptable manner. Vibrate concrete to obtain impervious concrete in the vicinity of all joints.

(d) Install waterstop in accordance with instructions of the manufacturer. Prior to use of the waterstop material in the field, submit to the Engineer for approval a sample of each size and shape to be used. Fabricate sample so that the material and workmanship represent in all respects the fittings to be furnished under this Specification.

(e) Place all sleeves, inserts, anchors, and other embedded items prior to placing concrete. Anchors and bolts cast in concrete shall be hot dip galvanized or stainless steel. Where permitted by the Engineer, concrete expansion bolts shall be stainless steel and of the wedge anchor type. Take all necessary precautions to prevent embedded items from being displaced, broken or deformed during concreting operation. Protect drains from intrusion of concrete.

6. Placing:

(a) Equipment for mixing and transporting concrete must be clean. Forms shall be thoroughly clean and damp, and reinforcing shall be secured in place. Runaways for transporting concrete shall not rest on reinforcing. When concrete is placed against earth, sprinkle sufficiently before placing.

(b) Deposit of concrete in forms no longer than ninety (90) minutes after the initial design water has been added to the cement and aggregates. Concrete which cannot be so placed shall not be used and shall be wasted. **No additional water shall be added**. No retempering with water is permitted.

(c) In addition to the requirements of ASTM C94, the concrete delivery tickets shall indicate the cement content and water/cement ratio.

(d) During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection and curing. Comply with ACI 305R "Hot Weather Concreting" recommendations.

(e) Do not place concrete in forms unless the water level is below the concrete to be placed, even if it is necessary to maintain the dewatering, or under rain.

(f) Do not place concrete under water except for tremie concrete as called for on the Contract Drawings. Submit for approval plan and details of means and methods for installation of seal tremie concrete prior to commencement of work. Seal concrete which subsequently fails to perform, shall be repaired or replaced at no additional cost to the City.

(g) Place seal concrete under water in the space in which it is to remain, by means of a tremie, a closed-bottom dump bucket of not less than one cubic yard capacity, or other approved method, and do not disturb after it is deposited.

Deposit all seal concrete in one continuous pour. Do not place concrete in running water. Design all formwork, to retain concrete under water, to be watertight. Submit shop drawings for the design of formwork and excavation sheeting signed and sealed by a Florida Registered Professional Engineer.

(h) The tremie shall consist of a tube having a minimum inside diameter of ten (10) inches, and shall be constructed of sections having tight joints. No aluminum parts which have contact with the concrete will be permitted. The discharge end shall be entirely seated at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised (but not out of the concrete at the bottom) until the batch discharges to the bottom of the hopper, after which the flow shall be stopped by lowering the tremie. The means of supporting the tremie shall be such as to permit the free movement of the discharge end over the entire top surface of the work, and shall permit it being lowered rapidly when necessary to choke off or retard the flow. The flow shall preferably be continuous and in no case shall be interrupted until the work is completed. Exercise special care to maintain still water at the point of deposit.

(i) When the concrete is placed by means of a bottom dump bucket, the bucket shall be lowered gradually and carefully until it rests upon the concrete already placed. The bucket shall then be raised very slowly during the discharge travel; the intent being to maintain, as nearly as possible, still water at the point of discharge and to avoid agitating the mixture. Aluminum buckets will not be permitted.

(j) Do not commence pumping, to dewater a sealed cofferdam, until the seal has set sufficiently to withstand the hydrostatic pressure, and in no case earlier than 72 hours after placement of concrete.

(k) Notify Engineer a minimum of 24 hours prior to concreting and request a specific time for observation of reinforcing and formwork for portions of concrete work to be placed. No observation will made by the Engineer until rebar installation for all work to be done and all formwork has been completed and approved by the Contractor's field superintendent. Do not order concrete until all correction and additions indicated by the Engineer have been made. Should the Engineer's observation reveal that work is improperly prepared and an additional observation will be required, he will so inform the Contractor and all above requirements shall also govern.

7. Repair of Surface Defects:

(a) Repair all concrete surface defects, which includes, but not limited to cracks, tie holes (no plastic cones), uneven holes, honey combs, rough frame work and

other objectionable conditions deemed unacceptable to the Engineer immediately after form removal. This repair work is to be done for all concrete expose surfaces, liquid applied surface or painted surfaces in or out of the water. Repair all cracks and defects in the concrete floors, beams, joists, columns, and other structural members, roof and walls that may occur up to one year after acceptance of work regardless of the cause to the satisfaction of the Engineer. Test unformed, surfaces such as monolithic slabs, for smoothness and verify placement tolerances specified for each surface and finish. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness. Repair unformed surfaces that contain surface defects which affect durability of concrete. Surface defects, as such, include cracking, cracks which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets and other objectionable and rough conditions.

(b) Proprietary compounds for adhesion or as patching ingredients may be used, if approved by the Engineer. All structural repair of surface defects to be made require the approval of the Engineer, as to the method and procedure. Approval of the completed work must be obtained from the Engineer.

8. Finishing of Formed Surfaces.

(a) Apply rough form finish to exterior walls below grade not exposed to water.

(b) Apply smooth form finish to exterior and interior walls and columns exposed to water.

(c) Apply smooth form finish to interior walls and underside of floors, stairs and slabs.

(d) In addition to the smooth form finish, apply a grout cleaned finish to concrete walls and surfaces exposed to public view and underside of formed floors, stairs or slabs.

(e) Apply a rubber float grout mix to properly prepared concrete surface, only when approved by the Engineer. Mix shall have one part Portland cement to two parts fine sand in a 50% water and 50% Acryl #60 (Thoroseal or Acryl Set) mix or Acryl Set by Master Builders. Make a 10' by 10' sample on the concrete wall for the approval of the Engineer. Finished surface shall be a non-dusting hard finish, when scratched with a ¼" metal edge.

(f) Finish concrete surface, interior or exterior, below or above water shall include all:

(1) Exposed concrete.

(2) Grout finished concrete.

(3) Painted surface concrete.

(4) Liquid membrane finished concrete shall comply with manufacturer's requirements.

(5) The entire surface of finished concrete shall have a smooth uniform surface, there shall be no offsets, visually bulges, or wavering in the finished surfaces. The joints must be accurately aligned, they cannot be uneven or in or out, a higher and lower, there shall be no fins, projection or unevenness between forms.

(6) If after stripping the forms the Engineer determines that the finished concrete does not comply with any or all of the above requirements, the Contractor shall submit his proposal in writing to the Engineer as to his methods of correcting the work at no added cost to the City, which shall include, but not limited to all grinding of fins, projections, unevenness between joints, form high spots and uneven spots.

(7) In addition to all other requirements, concrete surfaces exposed to public view, irrespective of size, area or location shall be completely clean and free of: (1) Stains of any nature, (2) Parts of forms or other wood of any nature, (3) laitance, (4) "Run-downs" of leaked water from secondary pours, (5) Nails, (6) Strips, (7) Ties and (8) all other extraneous, deleterious materials and/or substances which may affect the finished appearance and condition of exposed concrete. Surfaces not meeting the above requirements are to be repaired and treated at no additional cost to the City.

9. Slabs

   (a) Unless otherwise noted on the Contract Drawings, place strips alternately at maximum 20 feet center-to-center and to align with column centerline. Do not place adjacent strips until elapse of twenty four hours after first strip is placed. Place slabs on grade by the "strip-cast" method. Method to be reviewed by the Engineer. Provide saw-cut joints at maximum 20 feet center-to-center and to align with column center lines within four hours of final finishing.

   (b) Provide doweled construction joints where shown on the Contract Drawings.

   (c) Provide a hard steel troweled finish, free from trowel marks and irregularities, to slabs and floors.

   (d) Provide a light hair-broom finish to exterior slabs and floors exposed to public view. Leave hair-broom lines parallel to direction of the slab drainage.

   (e) Provide a stiff bristle broom finish to slabs and floors with slopes greater than 10 percent. Leave broom lines parallel to slope drainage.

   (f) Finish exposed edges of slabs, floors and tops of walls with a ¼-inch radius edge unless a chamfer is called for on the Contract Drawings.

10. Curing and Protection

   (a) Comply with ACI 305 "Hot Weather Concreting", Chapter 4, with the supplements and modifications to ACI 301 listed herein.

   (b) Only concrete water curing for not less than 7 days (24 hours/day continuously) will not be accepted; Burleen mats shall be used in curing. Water cure by ponding or continuous sprinkling covering complete surface with minimum runoff. The application of water to wall may be interrupted for grout cleaning only over the areas being cleaned at the time, and the concrete surfaces shall not be permitted to become dry during such interruption.

   (c) Begin all water curing as soon as concrete is set and concrete will not be damaged. Keep concrete and wall forms wet the first 24 hours. Remove forms as indicated in Formwork, Section 3.02-C.4, and continue with 7 day water curing. Recoat damaged surfaces subject to heavy or surfaces damaged by construction procedures within 3 hours of damage. Method of repair shall be approved by the Engineer.

11. Testing

(a) Testing laboratory will be selected and paid for by the Contractor. Send results of all test to the City and to the Contractor. The Contractor shall notify the Testing laboratory at least 24 hours before each concrete placing.

(b) Obtain and mold 3 specimens for each fifty (50) cu. yds., or fraction thereof, of each class of concrete placed each day or as directed by the Engineer.

(c) Cure specimens from each sample in accordance with ASTM C31. Record in test report any deviations from this Standard.

(d) Test specimens in accordance with ASTM C39. Test one specimen at twenty eight (28) days for acceptance and, one specimen at three (3) days and seven (7) days respectively, for information. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinders shall be considered the test result.

(e) Contractor's Superintendent shall color code on a set of structural drawings the extent of days work and date to conform to cylinders test.

(f) Perform slump test at discharge of mixer, one for each strength test in accordance with ASTM C143. In the event slump is excessive, testing laboratory will immediately notify the Contractor's superintendent and the Engineer's representative on site. The Contractor shall then reject all concrete with excessive slump and/or deposit time.

(g) Drying Shrinkage Test: A drying shrinkage test shall be conducted on the preliminary trial batch with the maximum water-cementitious materials ratio used to qualify each proposed concrete mix design using the concrete materials, including admixtures, that are proposed for the project. Three test specimens shall be prepared for each test. Drying shrinkage specimens shall be 4 x 4 x 11 inch prisms with an effective gauge length of 10 inches fabricated, cured, dried, and measured in accordance with ASTM C 157 except with the following modifications:

(1) Specimens shall be removed from the molds at an age of 23 hours ± 1 hour after trial batching, shall be placed immediately in water at 73° F ± 3°F for at least 30 minutes, and shall be measured within 30 minutes thereafter to determine original length and then submerged in lime-saturated water as specified in ASTM C157. Measurement to determine expansion expressed as a percentage of original length shall be taken at age 7 days. The length at 7 days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored

immediately in a humidity controlled room maintained at 73° F ± 3°F and 50% ± 4% relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be reported separately for 7, 14, and 21 days ±4 hours of drying from “0" day after 7 days of moist curing.

(2) Drying shrinkage deformation for each specimen shall be computed as the difference between the base length (at “0" days drying age) and the length after drying at each test age. Results of the shrinkage test shall be reported to the nearest 0.001 percent. If drying shrinkage of any specimen deviates from the average for that test age more than 0.004 percent, the results for that specimen shall be disregarded.

(3) The average drying shrinkage of each set of test specimens cast in the laboratory from a trial batch as measured at the 21 days drying age shall not exceed 0.036 percent and 0.042 percent at the 28-day drying stage for all concrete.

(4) The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

(5) If the required shrinkage limitation is not met during construction, the Contractor shall take any or all of the following actions at no additional cost to the Owner, for securing the specified shrinkage requirements. These actions may include changing the source or aggregates, cement and/or admixtures, including Tetra Guard AS 20 or approved equal; reducing water content; washing of aggregate to reduce fines; increasing the number of construction joints; modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

(6) Alkali-aggregate reactivity potential shall be determined in accordance with Appendix XI of ASTM C 33. Aggregates shall be tested in accordance with ASTM C 289 and C295 to determine potential reactivity. Aggregates which do not indicate a potential for alkali reactivity or reactive constituents may be used without further testing. Aggregates which indicate a potential for alkali reactivity shall be further tested in accordance with ASTM C227 or C1105, as appropriate, using a cement containing less than 0.6 percent alkalies. At the discretion of the Engineer, testing in addition to that indicated in Appendix XI of ASTM C33 may be performed on potentially reactive aggregates. Nonreactive aggregates shall be imported if, in the opinion of the Engineer, local aggregates exhibit unacceptable potential reactivity.

12. Evaluation and Acceptance of Concrete

    (a) If tests are insufficient or inadequate, test and evaluate by core tests. Failure of any concrete cylinder to meet specified requirements shall be deemed as non-complying and costs of additional tests to determine the adequacy or inadequacy shall be borne by the Contractor. Concrete rejected for any reason is to be removed and replaced, including labor, forms and reinforcing, to meet specifications at no additional cost to the City and no additional time extension.

13. Additional Requirements

    (a) Submit shop drawings as required per General Conditions and elsewhere in these specifications. Prime Contractor shall check and approve all shop drawings prior to submission. Do not fabricate any item requiring shop drawings until approval of shop drawings has been granted by the City. Partial shop drawings are not accepted, submit drawings for complete submittal.

    (b) Provide precast or cast-in-place reinforced concrete lintels at all masonry openings and sills at all windows. Reinforce to suit loads and span. Provide minimum 8" bearing at each end and, pour integral with columns where opening abuts columns.

    (c) Sidewalks in ROW: Provide poured-in-place 6" thick concrete slab, 3000 psi concrete, with continuous 8" deep thickened slab edges. Isolate walks from vertical surfaces with ½" expansion joint material. Provide ½" expansion bituminous joint material flush with top of concrete slabs at 20 feet on center and tooled joints at 5 feet on center. Tool all open edges to a smooth radius and all edges adjacent to the forms. Note that the requirements listed above must meet those of the agency having jurisdictional authority over the ROW limits which may be more stringent than these requirements.

END OF SECTION

SECTION 03345

CONCRETE FINISHING AND CURING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This section describes materials and methods of concrete finishes, curing, repair of defects and surface protection.

B. Related Work Described Elsewhere:

1. Cast-In-Place Concrete: Section 03300.

1.02 SUBMITTALS

A. Curing Compound: Submit manufacturer's statement of compliance with these specifications and recommend coverage to meet or exceed the specified tests and manufacturer's application instructions in accordance with Section 01420: Drawings and Submittals.

PART 2 - PRODUCTS

2.01 MATERIALS

A. See Section 03300: Cast-In-Place Concrete.

B. Curing Compound:

1. Curing compound shall conform to ASTM C-309, Type 2, Class BN.

2. Curing compound shall be compatible with required finishes and coatings, as specified in Division 9: Finishes.

3. Curing compound for exposed concrete not to receive special finishes, protective coatings and/or concrete toppings shall be "Super Rez-Seal", as manufactured by Euclid Chemical Co., Cleveland, Ohio or equal.

4. Curing compound for exposed concrete to receive special finishes, protective coatings and/or concrete toppings shall be "Kurez-DR", as manufactured by Euclid Chemical Co., Cleveland, Ohio or equal.

C. Mortar for Repair of Concrete: Mortar used for repair of concrete shall be made of the same materials as used for concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cement to two and one-half (2-

1/2) parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.

D. Burlap Mats: Conform to AASHTO Specification M-182.

E. Sisal-Kraft Paper and Polyethylene Sheets for Curing: Conform to ASTM C-171.

PART 3 - EXECUTION

3.01 CONCRETE FINISHES

A. Complete concrete surfaces in accordance with the following schedule:

Finish Designation	Area Applied
F-I	Exterior walls below grade not exposed to water.
F-2	Exterior and interior walls exposed to water.
F-3	Walls of structures or buildings exposed to view. Underside of formed floors or slabs.
S-1	Slabs (roof and floor) not water bearing (Building).
S-2	Slabs and floors which are water bearing. Slab surfaces on which mechanical equipment moves.
S-3	Slabs and floors of structures which are exposed to view.
S-4	Slabs, beams, girders, columns, and floors of structures. Slabs and floors at slopes greater than 10 percent (10%).
E-1	Exposed edges of slabs, floors, and walls tops.
E-2	Top of walls, beams and similar uniform surfaces.

B. Concrete surface repair.

1. Finish F-1: Repair defective concrete, fill depressions deeper than 1/2 inch, and fill tie holes.
2. Finish F-2: Repair defective concrete, remove fins, and fill depressions 1 /4 inch or deeper, and fill tie holes.
3. Finish F-3: In addition to Finish F-2, fill depressions and airholes with mortar. Dampen surfaces and then spread a slurry consisting of one (1) part cement and one-half (1/2) parts sand by damp loose volume, over the surface of clean burlap

pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap.

4. Finish S-1: Smooth steel trowel finish

5. Finish S-2: Steel trowel finish free from trowel marks and all irregularities.

6. Finish S-3: Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.

7. Finish S-4: Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines parallel to the direction of slope drainage.

8. Finish E-1: Exposed edges of slabs, floors, and tops of walls, finish with a 1/4 inch radius edger if a chamfer is not indicated.

9 Finish E-2: Struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of formed surfaces.

3.02 FINISHING OF FORMED SURFACES

A. Water cure surfaces until finishing and repairing are completed.

B. As soon as possible after forms are removed, remove fins and irregularities by grinding or rubbing, fill depressions deeper than specified with mortar, and fill tie holes.

C. Ream tie holes with toothed reamers until surface of hole is rough and clean. Coat surface with epoxy bonding compound and fill with mortar.

D. Finish tapered tie holes as follows:

1. Sandblast tie rod hole and blow clean prior to filling.

2. Drive rubber plug, with one end open, to the center of the hole. Plug size shall be larger in diameter than the diameter of the hole at the center of the wall.

3. Coat entire annular surface of the hole with epoxy prior to filling with mortar. Apply epoxy in accordance with manufacturer's instructions.

4. Fill each side of hole with mortar. Apply mortar to the "wet" side of the wall first. Consolidate mortar solidly into the hole.

5. Notify Engineer of tie rod filling schedule.

3.03 REPAIR OF SURFACE DEFECTS

A. Remove honeycombed and other defective concrete down to sound concrete. Edges shall be perpendicular to surface. Sandblast surfaces to receive repair.

B. Coat sandblasted surface with epoxy bonding compound.

C. Place mortar in layers having a compacted thickness of 3/8 inch. Scratch surface of each layer to promote bonding with next layer.

D. Finish repair shall match adjacent concrete and cure as specified.

E. Repair defective areas of more than 1 foot square and deeper than the reinforcing steel as above, except fill the area with pneumatically applied concrete.

3.04 REPAIR OF CRACKED CONCRETE (REFER TO STRUCTURAL STANDARDS DETAILS)

A. Alternate methods of crack repair may be submitted by the Contractor for review by the Engineer.

3.05 CURING AND PROTECTION

A. Cure concrete surfaces in accordance with the following schedule:

Curing Method	Area Permitted
A.	All surfaces
B.	All surfaces
C.	Slabs and floor/roof
D.	All surfaces when maximum ambient temperature will not exceed 80 degrees Fahrenheit (°F) and humidity will not drop below 40 percent (40%) on the day of concrete placement and for the three days following.

Where wooden forms are used, wet them immediately before concreting and keep moist by sprinkling until removed. Keep all exposed surfaces of formed concrete moist until curing method is applied.

B. Cure concrete for not less than 14 days after placing in accordance with one of the following appropriate methods:

1. Method A - Water Spray Method: Tightly close off concrete surfaces to be cured by bulkheads or other means or entirely surround by tight enclosures, and keep the concrete surfaces moist by sprinkling, spraying or other means.

2. Method B - Wet-Burlap-Mat Method: Thoroughly wet and cover concrete surf aces to be cured with wet burlap mats as soon as the forms have been stripped or as soon as the concrete has set sufficiently to avoid marring the surface. Keep entire concrete surface and burlap continuously and completely wet during the entire curing period.

3. Method C - Curing Blanket Method: Thoroughly wet concrete surfaces to be cured and cover with curing blankets as soon as the concrete has set sufficiently to avoid marring the surface. The curing blankets shall be weighted to maintain close contact with the concrete surface during entire curing period. Should the curing blankets become torn or otherwise ineffective, keep surfaces moist and replace damaged sections. The curing blankets shall consist of one (1) of the following two (2) types:

   a. Sheets of heavy waterproof sisal-kraft paper laid with the edges butted together and with the joints between strips sealed with 2 inch wide strips of sealing tape or with the edges lapped not less than three inches and fastened together with waterproof cement to from continuous watertight joints; or

   b. Sheets of clean polyethylene, having a minimum thickness of four mils, laid with edges butted together and with the joints between sheets sealed with 1 inch wide strips of acetate tape.

   c. During the curing period, do not permit traffic of any nature or depositing of objects, temporary or otherwise, on the curing blankets.

4. Method D - Curing Compound Method: Spray the surface with two (2) coats of liquid curing compound. Apply in accordance with the manufacturer's instructions to cover the surface with a uniform film which will seal thoroughly. Apply second coat at 90 degrees for the first coat.

   Apply curing compound immediately after completion of the finish on unformed surfaces and within 2 hours after removal of forms on formed surfaces. Repair formed surfaces within the said 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after Method A, B, or C has been applied. When repairs are to be made to an area on which curing compound has been applied, first sandblast the area to remove the curing compound, then repair.

   Wherever curing compound may have been applied to surfaces against which concrete subsequently is to be placed and to which it is to adhere, remove the curing compound entirely by sandblasting prior to the placing of new concrete.

   Where the curing compound method is used, exercise care to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, repair the damaged portions immediately by the application of additional curing compound.

3.06 CONCRETE SURFACES TO BE COATED.

A. Concrete surfaces exposed to public view and which paints or coatings are to be applied shall be of even color, gray or gray-white. The surface shall have no pits, pockets, holes or sharp changes of surface elevation. Scrubbing with a stiff bristle fiber brush shall produce no dusting or dislodging of cement or sand.

END OF SECTION

SECTION 03400

PRECAST PRESTRESSED CONCRETE

PART 1 - GENERAL

1.01 INCLUDED

A. The work under this section includes the design, casting, delivery, erection and shoring of precast prestressed concrete structures as shown on the Contract Drawings.

1.02 Related work specified elsewhere

A. Section 03300 – Cast-in-Place Concrete, Reinforcing and Formwork.

B. Section 01340 – Shop Drawings.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section:

1. South Florida Building Code, latest edition.

2. ACI 318-95, Building Code Requirements for Reinforced Concrete.

3. PCI MNL 116, Manual for Quality Control for Plants and Production of Precast Concrete Products

4. ASTM A416, Specification for Uncoated Seven-Wire Stress-Relieved Steel Strand for Prestressed Concrete.

1.04 QUALITY ASSURANCE

A. Fabricator shall be a recognized prestressed concrete manufacturer with minimum five (5) years' experience in the manufacture and erection of similar units and whose design, fabrication and erection operations are supervised by a Florida Registered Professional Engineer.

1.05 CONTRACTOR SUBMITTALS

A. Shop Drawings: The Contractor shall submit shop and erection drawings for approval, showing concrete design strength; unit dimensions; unit weights; size, number, location and stress in prestressing strands; size, number and location of reinforcing bars including reinforcing for erection and handling stresses; concrete cover over reinforcing

and strands; bearing and anchorage details; concrete finish; curing method; erection marks; hoist points and shoring points.

B. Design Calculations: The Contractor shall submit for approval, neat, legible and complete design calculations prior to fabrication. Calculations shall be by a Florida Registered Professional Engineer whose seal shall appear on calculation sheets and shop drawings.

1. Calculations shall include predicted in-place cambers without superimposed loads, with superimposed dead loads and with superimposed dead loads and live loads.

2. Span length in calculations shall be from center of bearing to center of bearing.

3. Include bearing and anchorage details including those in the precast sections and those in the job cast concrete structure.

C. Certificates: The Contractor shall submit manufacturer's test certificates on prestressing strands and reinforcing.

D. Concrete Cylinder Tests: The Contractor shall submit copies of cylinder break reports by an approved commercial test laboratory, made from each casting for this project to verify that concrete has attained minimum ultimate prestressed transfer strength specified.

1.06 DEFINITIONS

A. In these Specifications, where the terms "Precast Concrete" and "Precast Concrete Specialties" are used, they shall have equivalent meaning.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete: Minimum 7 day ultimate compressive strength of 4000 p.s.i. Higher strength will be permitted to suit manufacturer's design. In other respects, concrete shall comply with requirements of Section 03300.

B. Prestressing Strands: High strength 7 wire strand conforming with ASTM A416-94. Elongation test conforming with ASTM A270-90 with minimum elongation at rupture of 3.5% in 24 inches. Tests need not be made if certification of conformance with specifications is provided by manufacturer. Use strand of U.S. manufacture.

C. Reinforcing Steel: ASTM A615, grade 60.

D. Forms: Provide smooth units true to size, shape and detail with flat panes, sharp lines and arises, free from warp, twist, bow or similar distortions, spalling, broken edges,

cracks or similar defects. Dimensional tolerances to be as provided in ACI 525 Standards Minimum Requirements For Thin Section Precast Concrete Construction.

2.02 FABRICATION

A. General: Fabricate units accordance with approved shop drawings and approved design calculations.

B. Unit design and fabrication: Conform with ACI Standard Building Code Requirements for Reinforced Concrete and the Prestressed Concrete Institute Standards. Fabricator shall design joists and beams in accordance with loads indicated on drawings. Camber under dead load or deflection under total load shall not exceed 1/360 of span.

C. Inserts: Install hanger inserts and sleeves in unit forms for mechanical and electrical items as provided under other sections and as shown on Drawings.

D. Curing: Top surface to receive water curing only.

E. Marking: Distinctively mark each unit with manufacturer's name and mark indicated on erection drawings.

F. Age: Units shall be minimum 10 days old before shipping or erection.

2.03 PREFORMED JOINT SEALANT

A. The joint sealing compound shall be Quik-Seal, a preformed, cold applied, ready to use plastic joint sealing compound as supplied by Quikset Utility Vaults, Santa Ana, California; Ram-Nick by K.T. Snyder Company; or approved equal.

2.04 MORTAR

A. Mortar used between the sections of precast concrete manholes and vaults shall be as recommended by the manhole section manufacturer.

2.05 NON-SHRINK GROUT

A. Non-shrink grout shall be as specified in the Section 03600, Grouting.

2.06 QUALITY CONTROL

A. Precast concrete units shall be made by an experienced manufacturer and shall be constructed as shown on the Drawings and specified herein and shall be free of defects, checks and cracks. Care shall be taken in the mixing of materials, casting, curing and shipping to avoid any of the above.

B. The Contractor shall notify the Department a minimum of 5 days before the units are cast and 5 days before shipment is made, in order to provide for plant inspection, if the Department so directs.

PART 3 - EXECUTION

3.01 ERECTION

A. Erection to be by manufacturer and supervised by manufacturer's Florida Registered Professional Engineer or his authorized representative. Handle and install units with precision, in conformance with drawings, details and erection drawings.

3.02 INSTALLATION

A. Required pads, plates and reinforcing bars shall be furnished for casting and anchorage in the adjoining work. The precast concrete units shall be installed in a workmanlike manner with the units tight and at right angles to the supporting beams or walls. The units shall be aligned and leveled in accordance with the procedures recommended by the manufacturer. Units shall be grouted by a mixture of not less than one part cement to three parts fine sand, care being taken to see that joints are filled. Damp grout that may have seeped through shall be removed before it hardens.

B. All openings in the precast units shall be made by the Contractor and are the responsibility of the Contractor. Where details for an opening are not shown on the Drawings, the opening shall be made in accordance with the recommendation of the manufacturer. When an opening causes a loss in carrying capacity of the unit, the adjacent units shall be designed to carry the additional dead and superimposed load transferred from the unit with the opening. The Contractor shall provide saddle headers as required.

C. Extreme care shall be used to avoid damaging or soiling concrete as no repairing or cutting will be permitted. Damaged units shall be replaced at the expense of the Contractor. Wooden hammers shall be used, with pinch bars being used on unexposed parts only.

3.03 CLEANING AND REPAIRS

A. Cleaning: Clean exposed surfaces of units of stains to a uniform appearance. Do not use caustic or acid cleaners.

B. Repairs: Repair nicks or chips in exposed areas.

END OF SECTION

SECTION 03600

GROUTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The scope of work involves the grouting of the space left void in the abandonment of the existing pipelines and structures. The work consists of furnishing all labor, equipment and materials and performing all work connected with the placement of the cementiceous grout to fill the void.

1.02 QUALITY ASSURANCE

A. Grouting shall be performed by a crew under the direct supervision of a superintendent that has experience in grouting of this nature.

B. Storage, mixing, handling and placement shall be in accordance with manufacturer's instructions and specifications.

C. Contractor is to provide all field tickets for grout mix deliveries for review by the City and FDOT, as applicable.

1.03 SUBMITTALS

A. Shop Drawings: Shop drawings shall be submitted in accordance with Section 01340. In addition, the following shall be submitted to the Engineer for acceptance prior to construction.

1. A detailed description of equipment and operational procedures to accomplish the grouting operation, including grout mixture design, grout mixer type, grout samples, and test data.

2. A detailed description of the grouting time schedule and a plan showing the location of grouting injection ports and vent ports to ensure that the pipe is fully grouted for each section, from end to end.

3. Submittals for caps to be installed on each end of the piping.

PART 2 - PRODUCTS

2.01 GROUT MATERIAL

A. The grout shall be a "flowable fill" consisting of a mixture of Type 1 Portland Cement, Type "F" Flyash (ASTM 618), sand and water.

B. The mixture shall contain a minimum of 50 pounds cement and minimum of 400 pounds flyash per cubic yard of grout and must allow for pumping and complete filling of piping voids.

2.02 EQUIPMENT

A. All grout shall be mixed with a high shear, high energy colloidal type mixer to achieve the best uniform density.

B. The grout shall be pumped with a non-pulsating centrifugal or tri-plex pump.

C. The mixer shall be capable of continuous mixing. Batch mixing shall not be permitted.

PART 3 - EXECUTION

3.01 GROUTING

A. Grouting of the annular space due to the abandonment of the existing pipe will be allowed in continuous individually bulkheaded segments of up to 500 linear feet for 6” diameter piping, 750 linear feet for 8” to 12” diameter piping, and 1000 linear feet for greater than 12” diameter piping. Note that these lengths are recommended standards but each section and diameter of piping may vary from these maximum lengths on a case-by-case basis. The lengths of piping and locations of caps are to be included on the plan submitted by the Contractor as required in the Submittal section herein.

B. Grout shall be placed in a maximum of three stages, with the initial stage volume equal to or greater than 50% of the total volume for that section of pipe being grouted. The maximum time wait between grouting stages shall be 24 hours.

C. For each stage, mix and pump the material in one continuous process so as to avoid partial setting of some grout material during that stage, thus, eliminating voids and possible subsequent surface damage due to "cave-ins".

D. Each section shall be grouted by injecting grout from the lowest point and allowing it to flow toward the highest point to displace water from the annulus and assure complete void-free coverage. Grout shall be placed through tubes installed in the bulkheads at the insertion pits or manholes. Grout tubes shall be at least 2-inch nominal diameter.

E. After the ends of each section of pipe are exposed, the entire space, not to exceed 300 linear feet end to end, shall be sealed by controlled pumping of grout until it flows from

the pipe at the opposite end of the grouting. **Grouting shall be carried out until the entire space is filled.**

F. Grout pressure in the void space is not to exceed five (5) psi above maximum hydrostatic groundwater level. An open ended, highpoint tap or equivalent vent must be provided and monitored at the bulkhead opposite to the bulkhead through which grout is injected. This bulkhead will be blocked closed as grout escapes to allow the pressuring of the annular space.

3.02 FIELD QUALITY CONTROL

A. The quality of the grout, application of the equipment and installation techniques are the responsibility of the Contractor. The review and acceptance or approval of specific mix design, equipment or installation procedures shall in no way relieve the Contractor of his obligation to provide the final product as specified herein.

END OF SECTION

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DIRECT TRAFFIC STEEL ACCESS HATCHES

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This section covers supply and installation of access hatches for pump station wet wells or valve boxes where called for by the Plans.

B. The heavy-duty angel type floor access door is designed for interior and exterior applications where water tightness is not required. It is designed to receive AASHTO H20-44 wheel loads on two-lane streets with opposing traffic where the posted speed limit does not exceed 35 miles per hour. Areas where these doors cannot be used included - but, are not limited to - roadways inside or leading into: seaport facilities, military bases, airports, landfills, freight terminals, bus terminals, and any other area where there is continuous commercial vehicle traffic.

PART 2 – PRODUCTS

2.01 HATCHES

A. The floor access door shall be Model DT-AHS and/or DT-AHD as manufactured by U.S.F. Fabrication, Inc. with the size being specified on the plans.
B. Cover shall be 1/2 - inch thick steel diamond plate reinforced for an AASHTO H20-44 wheel load. Upon request, manufacturer shall provide structural calculations showing that the door(s) design meets the loading requirements of AASHTO H20-44.
C. The frame shall be 1/2 - inch thick steel angle with anchors welded to frame for casting into concrete. In the closed position the cover shall be bolted to the frame with 316 stainless steel allen-head bolts to allow for H20-44 direct traffic loading - an allen-head socket with torque wrench will be provide with the door(s). The allen-head bolts must be tightened to 25 foot pounds of torque and securely fastened using Loctite 242 whenever the cover is closed to insure safe and proper performance of the door(s). For the security the cover shall have a recessed staple for padlock. The floor access door(s) shall be equipped with a flush steel lifting handle that does not protrude above the cover, and hold open arms that automatically keep the cover in its upright open position.
D. A steel skirt shall be welded to the frame to provide a combined height equal to the depth of the concrete slab.
E. The door(s) shall have tamper resistant hinges with recessed stainless steel pins and lungs. The door(s) shall have open stainless steel; horizontal springs to assist in opening the door and reducing the force during closing. The floor access door(s) shall have a hot-dipped galvanized finish.
F. Installation shall be in accordance with the manufacturer's attached instructions. The entire frame, including the seat on which the reinforcing rests, shall be supported by concrete or other material designed to support the specified load.
G. The door(s) shall be manufactured and assembled in the United States. Manufacturer shall guarantee the door(s) against defects in materials and workmanship for the period of (5) five years.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Contractor shall furnish all materials, labor, equipment, and incidentals required to provide a protective coating system for the surfaces listed herein and not otherwise excluded. All surfaces described shall be included within the scope of this Section. All above ground force main piping and fittings will be required to be painted, in addition to having Protecto 401 coatings for all ductile iron piping and fittings (see also Section 09901).

B. The work includes painting and finishing of interior and exterior exposed items and surfaces such as ceilings, walls, floors, miscellaneous metal, doors, frames, transoms, roof fans, construction signs, guardrails, posts, non-stainless steel pipes, fittings, valves, 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 Specifications as stated herein. The following major items of the Project shall be coated:

1. Interior and exterior of buried concrete sanitary structures including the pumping station wet well and manholes.

2. Submerged surfaces, surfaces exposed to wastewater, and surfaces in wetwells, valve vaults and meter vaults of any ferrous metal and aluminum components of equipment, piping, fittings and valves (except stainless steel).

3. Exposed ferrous surfaces of equipment, pumps, motors, tanks and ferrous or galvanized metal fittings and accessories.

4. Exposed surfaces of PVC components of piping, fittings, valves, electrical conduit, and equipment.

5. Exposed exterior surfaces of all metallic piping, fittings, and valves located on the interior and exterior of buildings and structures covered in this Section.

6. Embedded aluminum or aluminum in contact with dissimilar metals or in contact with corrosive atmospheres.

C. "Paint" as used herein means all coating systems, materials, including primers, emulsions, enamels, epoxies, sealers and fillers, and other applied materials whether used as a prime, intermediate, or finish coats.

D. The following items will not be painted unless otherwise noted:

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, such as valve and damper operators, linkages, sensing devices, and motor and fan shafts.

3. Aluminum or fiberglass handrails, walkways, toeboards, windows, louvers, grating, checker plate, hatches, and stairways.

4. Stainless steel angles, tube, pipe, etc.

5. Products with polished chrome, aluminum, nickel, or stainless steel finish.

6. Stainless steel, brass, bronze, and aluminum other than exposed utility tubing.

7. Flexible couplings, lubricated bearing surfaces, insulation, and plastic pipe or duct interiors.

8. Plastic switch plates and receptacle plates.

9. Signs and nameplates.

10. Finish hardware.

11. Packing glands and other adjustable parts, unless otherwise indicated.

12. Portions of metal, other than aluminum, embedded in concrete. This does not apply to the back face of items mounted to concrete or masonry surfaces which shall be painted before erection. Aluminum to be embedded in, or in contact with, concrete shall be coated to prevent electrolysis.

13. Exterior concrete surfaces of all structures except manholes, vaults, and wet wells and buried stemwalls for buildings.

1.02 RELATED WORK

A. Paint piping and equipment for identification purposes in accordance with the specifications.

1.03 QUALITY ASSURANCE

A. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint material manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Provide undercoat paint produced by the same manufacturer as the finish coats. Undercoat and finish coat paints shall be compatible. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

C. Painting shall be accomplished by experienced painters specializing in industrial painting familiar with all aspects of surface preparations and applications required for this project. Work shall be done in a safe and workmanlike manner.

D. Standards

1. ASTM.
2. OSHA.
3. NFPA.
4. SSPC.
5. NACE.
6. NSF.
7. AWWA.

E. Acceptable Manufacturers – also see Approved Manufacturer’s Listing which shall be the basis of approved products for this project.

1. Carboline Company.
2. Tnemec Company, Inc.
3. Keeler & Long, Inc.
4. International Paint/Devoe Coatings.
5. Induron.
6. Sherwin Williams.
7. Or approved equal.

F. All paints and materials used on interior tank or treatment unit surfaces shall conform to AWWA and/or Florida Department of Environmental Protection (FDEP) regulations as they may apply to potable water. The manufacturer furnishing the coating material shall furnish certification to the Engineer/Owner that the materials meet these agency provisions.

1.04 SUBMITTALS

A. Materials and Shop Drawings: Submit to the Engineer as provided in the General Conditions and Section 01340 - Shop Drawings, manufacturer's specifications, and data on the proposed paint systems and detailed surface preparation, application procedures and dry film thickness (DFT).

B. Schedule

1. The Contractor shall submit for approval a complete typewritten Schedule of Painting Operations within 90 days after the Notice to Proceed. This Schedule is imperative so that the various fabricators or suppliers may be notified of the proper prime coat to apply. It shall be the Contractor's responsibility to properly coordinate the fabricators' or suppliers' surface preparation and painting operations with these Specifications. This Schedule shall include for each surface to be painted, the brand name, generic type, solids by volume, application method, the coverage and the number of coats in order to achieve the specified dry film thickness, and color charts. When the Schedule has been approved, the Contractor shall apply all material in strict accordance with the approved Schedule and the manufacturer's instructions. Wet and dry paint film gauges may be utilized by the Owner or Engineer to verify the proper application while work is in progress.

2. It is the intent of this Section that as much as possible all structures, equipment, and piping utilize coating systems specified herein supplied by a single manufacturer. All exceptions must be noted on the Schedule. For each coating system, only one (1) manufacturer's product shall be used.

C. Color Samples: Manufacturer's standard color charts for color selection by Owner.

D. Samples- Painting

1. Paint colors will be selected by the Owner. Compliance with all other requirements is the exclusive responsibility of the Contractor.

2. Samples of each finish and color shall be submitted to the Owner or Engineer for approval before any work is started.

3. Samples shall be prepared so that an area of each sample indicates the appearance of the various coats. For example, where three (3) coat work is specified, the sample shall be divided into three (3) areas:

a. One (1) showing the application of one (1) coat only.

b. One (1) showing the application of two (2) coats.

c. One (1) showing the application of all three (3) coats.

4. Such samples when approved in writing shall constitute a standard, as to color and finish only, for acceptance or rejection of the finish work.

5. For piping, valves, equipment and miscellaneous metal work, provide sample chips or color charts of all paint selected showing color, finish, and general characteristics.

6. Rejected samples shall be resubmitted until approved.

E. The Contractor shall submit to the Owner, immediately upon completion of the job, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to coat all surfaces, in accordance with the requirements of this Section. Such certification shall make reference to square footage figures provided to the manufacturer by the Contractor.

1.05 DELIVERY, HANDLING AND STORAGE

A. Deliver all materials to the job site in original, unopened packages and containers bearing manufacturer's name and label in accordance with Section 01600: Materials and Equipment.

1. Provide labels on each container with the following information:

a. Name or title of material.

b. Fed. Spec. number if applicable.

c. Manufacturer's stock number, date of manufacture and expiration date (shelf life).

d. Manufacturer's formula or specification number.

e. Manufacturer's batch number.

f. Manufacturer's name.

g. Generic type.

h. Contents by volume, for major pigment and vehicle constituents.

i. Application instructions: thinning, ambient conditions, etc.

j. Color name and number.

2. Containers shall be clearly marked to indicate any hazards connected with the use of the paint and steps which should be taken to prevent injury to those handling the product.

B. All containers shall be handled and stored in such a manner as to prevent damage or loss of labels or containers.

C. Used rags shall be removed from the buildings every night and every precaution taken against spontaneous combustion.

1.06 WARRANTY AND GUARANTEES

A. Refer to Section 01740: Warranties and Bonds.

B. All paint and coatings work performed under these Specifications shall be guaranteed by the coatings applicator for 100 percent of the total coated area for both materials and labor against failures during the warranty period.

C. Failure under this warranty shall include flaking, peeling, or delaminating of the coating due to aging, chemical attack, or poor workmanship; but it shall not include areas which have been damaged by unusual chemical, thermal, or mechanical abuse.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All paint shall be manufactured by one of the suppliers listed in Paragraph 1.03E., herein, and shall be their highest grade of paint.

B. The following coating systems list a product by name to establish a standard of quality; other products of the same generic types may be submitted to the Engineer for approval as described in Paragraph 1.04., herein. When other than the specified coating system is proposed, the Contractor shall submit a typewritten list giving the proposed coatings, brand, trade name, generic type and catalog number of the proposed system for the Engineer's approval.

C. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to underlying paint. Shop paint shall be of the same type and manufacture as used for field painting by the Contractor.

D. Emulsion and alkyd paints shall contain a mildewcide and both the paint and mildewcide shall conform to OSHA and Federal requirements, including Federal Specification TT-P-19.

E. Finish coats containing lead shall not be allowed. Oil shall be pure boiled linseed oil.

F. Rags shall be clean painter's rags, completely sterilized.

2.02 COATING SYSTEMS

A. Class 1 Exposures - Exposed Concrete, Immersion, Non-Potable
(Black finish color only)

1. Class 1 exposures shall consist of all precast or cast-in-place reinforced concrete that is subject to exposure to continuous or intermittent immersion in wastewater, wastewater splashing or wastewater gases. Examples are listed below.

a. Valve vault (immersion due to periodic infiltration and inflow of storm water and possible waste water exposure during repairs).

b. Force main manifold valve vault (immersion due to periodic infiltration and inflow of storm water and possible waste water exposure during repairs).

c. Note: Interior walls of wet wells for the lift stations shall be lined.

2. Surface Preparation: As specified in Paragraph 3.02 herein and in addition the following:

a. Abrasive blast cleaning to remove laitance and roughen the entire surface equivalent to the surface of No. 80 grit sandpaper.

b. Concrete surfaces shall be patched to produce a consistent, void free surface, eliminating all air pockets, pinholes, bug holes, tie holes, form fins and burrs, honeycombs and cracks. Patching compound shall be a sand/portland cement mixture with a liquid, acrylic-polymer bonding additive equal to Master Builders Acryl-Set Liquid Polymer.

c. After surface patching remove remaining laitance or other debris by high pressure water blasting. Prior to application of coating system surfaces shall be clean and dry.

3. Class 1 Coating System:

a. Prime Coat: 100% Epoxy Penetrating Sealer.
Devoe Coatings PRE-PRIME 167 One coat, 1.5 mils DFT.

b. Finish Coats: Surface tolerant epoxy.
Devoe Coatings BAR-RUST 236 Black Two (2) coats, 8.0 mils DFT per coat.

c. Total minimum system finish coating thickness shall be 17.5 mils DFT.

B. Class 2 Exposures - Buried Exterior Concrete Surfaces

1. Class 2 exposures consist of all exterior below grade surfaces for precast concrete structures. Examples are listed below.

a. Exterior below grade surfaces of precast and/or cast-in-place concrete wet wells, sanitary manholes, and vaults.

2. Surface Preparation: Same as required for Class 1 exposure surface preparation specified in Paragraph 2.02.B.2 above.

3. Class 2 Coating System

a. Prime Coat: 100% Epoxy Penetrating Sealer.
Devoe Coatings PRE-PRIME 167 One coat, 1.5 mils DFT.

b. Finish Coats: Surface tolerant epoxy.
Devoe Coatings BAR-RUST 236 Black Two (2) coats, 8.0 mils DFT per coat.

c. Total minimum system finish coating thickness shall be 17.5 mils DFT.

C. Class 3 Exposures - Metals Exterior Exposed

1. Class 3 exposures consist of exterior metal surfaces exposed to the weather and environment. Such surfaces include:

a. Pumps, motors, equipment, and appurtenances

b. Above ground piping, fittings, valves, and metal conduit

c. Miscellaneous metal surfaces

d. Ladders, stairways, structural steel

d. Roof mounted equipment, hatches, fans, etc.

e. Galvanized and non-ferrous metal surfaces

g. Other surfaces obviously requiring field painting

h. Valve vault piping

i. Force main manifold valve vault

j. Air release valves

2. Surface Preparation: As specified in Paragraph 3.02 herein and, in addition, the following:

   a. All bare metals or areas that were shop primed that have been damaged shall be abrasive blast cleaned to SSPC-SP6, commercial blast cleaning standards.

   b. Shop primed items, stored on site for a prolonged period prior to coating, shall be prepared for coating following the coating manufacturer's recommendations prior to applying touch-up and subsequent coats. Surface preparation may include brush-off abrasive blasting or spot blasting to SSPC-SP6, commercial blast cleaning standards, for areas where the primer has been damaged and bare metal is showing.

   c. Non-ferrous metals shall be degreased and cleaned by washing with a water based dispersant such as Carboline Surface Cleaner #3. Rinse thoroughly with clean water after cleaning.

3. Class 3 Coating System

   a. Prime Coat for Ferrous Metal: Two part epoxy mastic primer. Devoe Coatings BAR-RUST 231 Epoxy mastic at 8.0 mils DFT.

   b. Prime Coat for Non-Ferrous Metal: Two part epoxy mastic primer. Devoe Coatings BAR-RUST 231 Epoxy mastic at 4.0 mils DFT.

   c. Finish Coat for Ferrous and Non-Ferrous Metal: High Build Acrylic Polyurethane. Devoe Coatings Devthane 379UVA Aliphatic Urethane at 3.0 mils DFT.

   d. Total minimum system finish shall be 7.0 mils for non-ferrous metal and 11.0 mils for ferrous metal surfaces.

D. Class 4 Exposures - Metals, Immersion, Non-Potable

1. Class 4 exposures consist of exterior metal surfaces that are submerged in wastewater or exposed to splashing, mists and gases off wastewater treatment processes. Metals to be coated include ferrous and non-ferrous surfaces that are not already finish coated or hot dip galvanized. Such surfaces include:

   a. Exterior surfaces of pumps, equipment, and appurtenances in contact with wastewater or gases from the liquids within the wet wells.

   b. Piping, fittings, and valves subject to contact with wastewater or gases from liquids within the wet wells, including piping, fittings, and valves located in wet wells, valve vaults, and meter vaults.

c. Miscellaneous ferrous and non-ferrous steel plates, shapes, hardware, etc. subject to contact with wastewater or gases from liquids within the wet wells. Galvanized steel surfaces shall not be painted.

2. Surface Preparation: As specified in Paragraph 3.02 herein and in addition the following:

a. Bare metals or areas that were shop primed that have been damaged, shall be abrasive blast cleaned to SSPC-SP5, white metal blast cleaning standards.

b. Shop primed items, stored on-site for a prolonged period prior to coating, shall be prepared for coating following the coating manufacturer's recommendations prior to applying touch-up and subsequent coats. Surface preparation may include brush-off abrasive blasting or spot blasting to SSPC-SP5, white metal blast cleaning standards, for areas where the primer has been damaged and bare metal is showing.

c. Non-ferrous metals shall be degreased and cleaned in compliance with SSPC-SP1 for solvent cleaning.

3. Class 4 Coating System

a. Prime Coat for Ferrous Metals: Surface tolerant epoxy.
Devoe Coatings BAR-RUST 236 Black One (1) coat, 8.0 mils DFT per coat.

b. Prime Coat for Non-Ferrous Metals: Polyamide epoxy primer.
Devoe Coatings DEVRAN 201H: One (1) coat, 2.5 mils DFT.

c. Finish Coats: Surface tolerant epoxy.
Devoe Coatings BAR-RUST 236 Black One (1) coat, 8.0 mils DFT per coat.

d. Total minimum system finish coating thickness shall be 16 mils DFT for ferrous metals and 10.5 mils DFT for non-ferrous metals.

E. Class 5 Exposures - Plastic Piping, Valves, Fittings, and Conduit

1. Class 5 exposures consist of PVC or fiberglass piping or electrical systems requiring color coding, and for protection of exposed, exterior plastic components from the elements, and shall include the following:

a. PVC and fiberglass piping, fittings, valves, and electrical conduits requiring color coding in accordance City specifications.

b. Exposed exterior plastic piping, valve, and fitting components subject to UV degradation and weathering by the elements.

2. Surface Preparation: As specified in Paragraph 3.02 herein, including cleaning and washing with detergent to remove all dirt and foreign material, and light surface abrasion using medium grade sandpaper. Remove dust, dirt and debris with clean rags prior to coating.

3. Class 5 Coating System:

   a. Finish Coats: Single component, water-borne acrylic topcoat.
   Devoe Coatings Devflex 4216: Two (2) coats, 3 mils DFT per coat.

   b. Total minimum system finish coating thickness shall be 6 mils DFT.

F. Class 6 Exposures - Aluminum

1. Class 6 exposures consist of aluminum surfaces embedded or in contact with concrete, mortar or plaster, or aluminum in contact with dissimilar metals which may cause corrosion due to electrolysis, and shall include the following:

   a. Aluminum surfaces in contact with concrete, mortar or plaster, such as slide gate frames, hatch cover frames, stair stringers, portions of grating and frames, floor plate and frames, etc.

   b. Aluminum surfaces in contact with dissimilar metals which may cause corrosion due to electrolysis.

2. Surface Preparation: As specified in Paragraph 3.02 herein, including solvent cleaning in accordance with SSPC-SP1 standards for solvent cleaning.

3. Class 6 Coating System:

   a. Prime Coat: Polyamide epoxy primer.
   Devoe Coatings DEVRAN 201H: One (1) coat, 2.5 mils DFT.

   b. Finish Coats: Surface tolerant epoxy.
   Devoe Coatings BAR-RUST 236 Black One (1) coat, 8.0 mils DFT per coat.

   c. Total minimum system finish coating thickness shall be 16 mils DFT for ferrous metals and 10.5 mils DFT for non-ferrous metals.

G. Class 7 Exposures - High Temperature Steel to 1,200°F

1. Class 7 exposures consist of carbon steel, hot dip galvanized steel and stainless steel surfaces exposed to high operating temperatures up to 1200°F, and shall include the following:

   a. Exposed diesel engine exhaust piping and fittings, exhaust silencer and silencer supports that do not have an applied insulation system.

2. Surface Preparation: As specified in Paragraph 3.02 herein, including abrasive blast cleaning to SSPC-SP10 standards for near-white blast cleaning for ferrous surfaces or solvent cleaning to SSPC-SP1 standards for solvent cleaning for galvanized or non-ferrous surfaces.

3. Class 7 Coating System:

   a. Prime Coat: Two-pack Modified Silicone Co-Polymer
   Dampney Thurmalox 225HD: One (1) coat, 4.5 mils DFT.

   b. Finish Coats: Modified Silicone Co-Polymer
   Dampney Thurmalox 225HD: One (1) coat, 4.5 mils DFT.

   c. Total minimum system finish coating thickness shall be 9.0 mils DFT.

PART 3 - EXECUTION

3.01 SHOP PAINTING

A. Surface Preparation - All ferrous metal to be primed in the shop shall have all rust, dust and scale, as well as all other foreign substances, removed by sandblasting or pickling in accordance with SSPC-SP5 or SP8, respectively. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting. Under no circumstances will cleaned metal be allowed to sit overnight before priming, or pretreatment and priming. All nonferrous metals shall be solvent cleaned prior to the application of primer. In addition, galvanized surfaces which are to be topcoated shall first be degreased then primed.

B. Materials Preparation

1. Mix and prepare painting materials in strict accordance with manufacturer's recommendations and directions, stirring materials before and during application to maintain a mixture of uniform density, free of film, dirt and other foreign materials.

2. No thinners shall be used except those specifically mentioned and only in such quantity as directed by the manufacturer in his instructions. If thinning is used, sufficient additional coats shall be applied to assure the required dry film thickness is achieved. The manufacturer's recommended thinner or clean-up solvent shall be used for all clean-up. Application by brush, spray, airless spray or roller shall be as recommended by the manufacturer for optimum performance and appearance.

C. Applications

1. All painting shall be done by skilled and experienced craftsmen and shall be of highest quality workmanship. Coating systems shall be as specified herein.

2. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied.

3. All paint and coatings materials shall be stored under cover and at a temperature within 10°F of the anticipated application temperature and at least 5°F above the dew point.

4. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color, and appearance.

5. Paint shall be applied in a neat manner with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be applied in a manner that will produce an even film of uniform and proper thickness.

6. Paint back sides of access panels and removable or hinged covers to match the exposed surfaces.

7. Equipment manufacturer or supplier shall provide touch-up paint for items with shop applied finish coats.

8. Where specified in the individual Sections, primer coat(s) shall be applied in the shop by the equipment manufacturer. The shop coats shall be as specified and shall be compatible with the field coat or coats.

D. Certification: The Contractor shall obtain from the equipment manufacturer or supplier, prior to shipment of equipment, a written certification that surface preparation, coating brand, material, DFT, and application method complied with this Section.

3.02 SURFACE PREPARATION

A. All dirt, rust, scale, splinters, loose particles, disintegrated paint, grease, oil, and other deleterious substances shall be removed from all surfaces which are to be coated.

B. Hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items and surfaces not to be painted which are in contact with or near surfaces to be painted shall be removed, masked, or otherwise protected prior to surface preparation and painting operations. Refer to Paragraph 3.09B.

C. Before commencing work, the painter must make certain that surfaces to be covered are in proper condition and must obtain Engineer's approval to proceed. Should the painter find such surfaces impossible of acceptance, he shall report such fact to the Engineer. The application of paint shall be held as an acceptance of the surfaces and working conditions

and the painter will be held responsible for the results reasonably expected from the materials and processes specified.

D. Program the cleaning and painting so contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.

E. Ferrous Metal Surfaces

1. Remove any oil or grease from surfaces to be coated with clean rags soaked in toluol or other solvent recommended by coating manufacturer in accordance with SSPC specifications. Any chemical contamination shall be eliminated by means of neutralization or flushing or both prior to additional surface preparation.

2. For immersion service, all sharp edges and welds shall be ground smooth to a rounder contour, all weld splatter shall be removed, and all pits and dents shall be filled, and all imperfections shall be corrected prior to sandblasting.

3. For non-immersion service, all sharp edges and welds shall be ground, all weld splatter shall be removed, all pits and dents shall be filled, and all imperfections shall be corrected prior to sandblasting.

4. For immersion service, all surfaces to be coated shall be sandblasted to white metal in accordance with Steel Structures Painting Council Specification SP-5. A white metal blast is defined as removing all rust, scale, paint, etc., to a clean white metal which has a uniform gray-white appearance. No streaks or stains or rust or any other contaminants are allowed. The proper abrasive to obtain the specified surface profile (anchor pattern) designated in the coating manufacturer's most recent printed application instructions shall be used. After sandblasting, dust and spent sand shall be removed from the surfaces by brushing or vacuum cleaning. The prime coat shall be applied as soon as possible after the blasting preparation is finished and always before the surface starts to rust. No sandblasted surface shall stand overnight before coating.

5. For non-immersion service, or wherever specified in the coating manufacturer's most recent printed application instructions for other services, all surfaces to be coated shall be sandblasted to near white metal in accordance with Steel Structures Painting Council Specification SP-10. A near white metal blast is defined as removing all rust, scale, paint, etc., except for very light shadows, very slight streaks or slight discolorations caused by rust stain, mill scale oxides, or slight, tight residues of paint or coatings that may remain.
The proper abrasive to obtain the specified surface profile (anchor pattern) designated in the coating manufacturer's most recent printed application instructions shall be used. After sandblasting, dust and spent sand shall be removed from the surfaces by brushing or vacuum cleaning. The prime coat shall be applied as soon as possible after the blasting preparation is finished and always

before the surface starts to rust. No sandblasted surface shall stand overnight before coating.

6. Where blast cleaning is done in the field, only "virgin" sand, grit, or abrasive will be used.

7. Inaccessible areas, such as skip-welded lap joints, or in between back-to-back angle iron bracing, shall be coated before assembly to prevent corrosive action from taking place in these inaccessible areas. All surface voids shall be seal-welded. Sharp corners and edges shall be ground to a smooth contour and welds prepared as described above.

F. Concrete Surfaces

1. All efflorescence, laitance, chalk, dust, dirt, oils, grease, concrete curing agents, form release agents, sealers, old coatings and other chemical contaminants shall be removed either by steam cleaning with detergent, by scrubbing with a hot trisodium phosphate solution consisting of 2 pounds of trisodium phosphate to each gallon of hot water (160°F), or by high pressure water blasting (3,000 psi or higher). Multiple cleaning operations may be required to remove all contaminants. Repeat the cleaning operation until the contamination is removed and flush the area with clean water to remove residual cleaning solution. Allow to dry thoroughly before coating.

2. All concrete surfaces to be coated shall be clean and dry. "Dry" is defined for new concrete as free of moisture and fully cured which is a minimum of 30 days at 75°F and 50 percent relative humidity or some equivalent cure time at other conditions (7 days minimum for stucco). Moisture content of concrete shall be determined by using both of the following methods.

   a. The presence of moisture shall be checked by taping a one-foot square piece of 20 mil thick minimum plastic film on the surface. Pieces of test plastic film should be placed at various locations that are likely to be slow curing, such as below grade, low spots in floors, inside corners and lower wall areas. The plastic film should be carefully sealed with tape to prevent the escape of any moisture or vapor that would be trapped behind the film. The film should be left in place overnight or longer to allow sufficient time for moisture migration. After 16 hours minimum remove and examine the backside for moisture condensation and inspect the concrete surface for darkened areas. The source of the moisture, if present, shall be located, and the cause corrected prior to coating.

   b. The presence of moisture shall also be determined with a moisture detection device such as a Delmhorst Model DLM2E. Moisture determined by this method shall be less than 14 percent moisture content before coating operations shall be allowed to proceed.

3. Old paint and unremoved tar stains shall be solvent cleaned with naphtha, trichloroethylene, or perchloroethylene. Proper safety precautions shall be observed if this step is necessary. The surface shall be flushed with fresh water and dried.

4. Do not use form oils incompatible with coating, concrete curing agents, or concrete hardeners on concrete surfaces to be coated.

5. Concrete and/or cinder block walls to receive a coating shall be air-blasted with 100 psi clean, dry, oil-free air to remove dust, etc., and wire brushed to remove all loose and/or weak mortar. See requirements for sumps, tanks and other water-bearing structures below.

6. Concrete floors shall be thoroughly swept clean and then acid etched. Acid etching consists of first dampening the entire surface with clean water, however, excess water that will form puddles shall be avoided. Acid etch the damp floor with a 10 to 15 percent solution of hydrochloric (muriatic) or phosphoric acid. Allow the acid to stand on the floor until the bubbling stops. While the acid is bubbling scrub the floor with stiff bristled brushes. Do not allow the "spent" acid to dry on the floor. Rinse the surface thoroughly with fresh water. If the surface does not appear as rough as medium grit sandpaper, repeat the above steps. Neutralize the surface with a 5 percent solution of soda ash, tri-sodium phosphate, or ammonium hydroxide in clean water. Let the solution stand for 10 minutes on the surface. Rinse thoroughly with water. The surface must be slightly alkaline (pH of 9.0) prior to coating.

7. The floors or concrete sumps, tanks or other water-bearing structures should be acid etched as described above or they may be sandblasted. The walls of concrete sumps and tanks must be sandblasted. Roughen the surface to a texture equivalent to that of medium grit sandpaper. Use compressed air that is oil-free. The abrasive used shall be dry silica sand with the maximum particle size that will pass through a 16 mesh screen and minimum particle size retained on a 30 mesh screen. After blast cleaning is completed, sand, dust and loose particles shall be removed from the surface by vacuuming or blowing off with high pressure oil-free air. Examine the surface for texture and uniformity, as well as the removal of dust, efflorescence and laitance. Patch voids and cracks that will cause discontinuities in the coating or unsightly appearance using a patching compound compatible with the coating system.

G. Wood Surfaces: Wood shall be clean and dry. Remove surface deposits of sap or pitch by scraping and wiping clean with rags dampened with mineral spirits or VM & P Naphtha. Seal knots and pitch pockets with shellac reduced with equal parts of shellac thinner (denatured alcohol) before sandpaper and finishing with fine grit and remove sanding dust. After the prime coat is dry, fill cracks and holes with putty or spackling compound. When filler is hard, sand flush with the surface using fine grit sandpaper. Sand lightly between coats with fine grit, open-coated sandpaper.

H. Galvanized Steel and Non-Ferrous Metal

1. Galvanized steel and aluminum will only be coated when so specified.

2. Surfaces shall be clean and dry. Remove dust and dirt by blowing off the surface with high pressure air or wiping clean with dry rags. Oil, grease and protective mill coatings shall be removed by solvent cleaning in accordance with SSPC-SPl.

3. White rust should be removed from galvanized steel or aluminum by hand or power brushing. Care should be taken not to damage or remove the galvanizing. Rust should be removed from old galvanized steel by Hand or Power Tool Cleaning in accordance with SSPC-SP2 or SP3.

4. Other surface preparation as outlined in the coating manufacturer's latest written application instructions shall be observed for more demanding exposures.

I. Stainless Steel

1. Stainless steel will only be coated when so specified, or when it is adjacent to areas to be coated such as piping supports, anchor bolts or flange bolts.

2. Stainless steel requires only solvent cleaning prior to coating using any one of the methods in SSPC-SP1. Only solvents and cleaning solutions containing less than 200 ppm of halogens should be used to prevent stress corrosion cracking.

3. Stainless steel may be whip-blasted to provide a surface profile to increase the mechanical bond of the coating system. The height of the profile and the texture required shall be defined for the operator and as a standard for the acceptance of the work. Pictorial standards for the surface cleanliness of carbon steel are not applicable to stainless steel, since there are no corrosion products or mill scale to remove from the surface.

4. Abrasive blast cleaning procedures outlined by Steel Structures Painting Council for carbon steel may also be used for stainless steel. Only very hard silica sand or other abrasive media shall be used for a fast cutting action and to obtain a sharp angular profile.

J. PVC or Other Plastic Piping or Ductwork

1. Solvent clean.

2. If recommended by manufacturer, lightly abrade surface with medium grade sandpaper. Remove dust by wiping with clean rags.

3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in strict accordance with manufacturer's recommendations and directions, stirring materials before and during application to maintain a mixture of uniform density, free of film, dirt, and other foreign materials.

B. Except where otherwise specified, thinning shall be done only if necessary for the workability of the coating material and then, only in accordance with the coating manufacturer's most recent printed application instructions. Use only thinner provided by coating manufacturer. If thinning is used, sufficient additional coats shall be applied to assure the required dry film thickness is achieved. The manufacturer's recommended thinner or clean-up solvent shall be used for all clean-up. Application by brush, spray, airless spray or roller shall be as recommended by the manufacturer for optimum performance and appearance.

3.04 APPLICATION

A. Paint all exposed surfaces in rooms scheduled for painting whether or not colors are designated in schedules, except where the natural finish of material is obviously intended and specifically noted as a surface that will not be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color of finish is not designated, the Engineer will select these from standard colors available for the materials systems as specified.

B. Color Selection

1. Colors for Multi-Coat Systems: Each coat shall be applied in a different color or shade from the preceding coat to aid in determining the uniformity and coverage of the coating. The finish coat color shall be selected by the Owner or Engineer. When a white finish coat is specified, the last two (2) coats shall be white.

2. Color Coding Piping: All exposed piping shall be identified as specified in the City's standards. Pipe identification system shall include color coding or banding, legends, and arrows.

C. All painting shall be done by skilled and experienced craftsmen and shall be of highest quality workmanship.

D. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied. All equipment shall be maintained in good working order and shall be comparable to that described in the coating manufacturer's most recent application instructions.

It shall be thoroughly cleaned and inspected daily. Worn spray nozzles, tips, etc., shall be replaced regularly. Effective oil and water separators shall be used and serviced on all air lines.

E. All paints and coating materials shall be stored under cover and at a temperature within 10°F of the anticipated application temperature and at least 5°F above the dew point.

F. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color, and appearance.

G. Paint shall be applied in a neat manner with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be applied in a manner that will produce an even film of uniform and proper thickness. Allow each coat to dry thoroughly before applying the next coat following manufacturer's recommendations taking into account temperature and relative humidity.

H. All interior surfaces of structures shall be finish coated prior to installation of equipment, conduit, and other exposed items. Paint back sides of access panels and removable or hinged covers to match the exposed surfaces.

I. Finish exterior doors on tops, bottoms, and side edges the same as the exterior faces, unless otherwise indicated.

J. Sand lightly between each succeeding enamel or varnish coat.

K. Omit the field primer on metal surfaces which have been shop-primed and touch-up painted, unless otherwise specified.

L. The prime and intermediate coats as specified for the various coating systems may be applied in the shop by the manufacturer. The shop coats shall be of the type specified and shall be compatible with the field coating. Items such as pumps, motors, equipment, electrical panels, etc. shall be given at least one touch-up coat with the intermediate coating material and one (1) complete finish coat in the field.

3.05 APPLICATION RESTRICTIONS

A. Environmental Requirements

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.

a. The conditions below shall be adhered to even if manufacturer's recommendations are less stringent. If manufacturer's recommendations are more stringent, they shall apply.

b. No coatings shall be applied when the air, surface, and material temperature is below 55°F or above 95°F for 24 hours prior to and 24

hours after coating application. Surface temperature shall be at least 5°F above the dew point for 24 hours prior to and 24 hours after coating application. The dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Weather Bureau psychometric tables. Do not apply coatings when the relative humidity exceeds 85 percent or to damp or wet surfaces, unless otherwise permitted by the coating manufacturer's printed instructions. No painting shall be done when the surfaces may become damaged by rain, fog or condensation or when it is anticipated that these conditions will prevail during the drying period, unless suitable enclosures to protect the surface are used.

Where heat is necessary, it shall be supplied by the painting applicator and shall be of such type that it will maintain an air and coated surface temperature of 55°F minimum prior to and after the coating application as described above, and 90°F minimum during the cure stage if hot air forced curing is recommended by the coating manufacturer for special coatings. Further, this heater shall be of such type as not to contaminate the surface area to be or being coated with combustion products. The Contractor shall supply utilities to run electric or gas heaters. Any surface coating damaged by moisture or rain shall be removed and redone as directed by the Owner or Engineer.

2. Do not apply finish in areas where dust is being or will be generated during application through full cure.

3. All exterior painting shall be done only in dry whether.

4. Spray application shall occur only when wind velocities, including gusts, are less that 10 miles per hour. All materials, equipment, etc. in the vicinity of spray application shall be protected from overspray.

B. Application of materials shall be done only on properly prepared surfaces as herein specified. Between any two coats of material, unless specifically covered in the coating manufacturer's most recent printed application instructions, if more than one (1) week passes between subsequent coats, the coating manufacturer shall be contacted for his recommended preparation of the surface prior to application of the next coat. This preparation might include brush-off blasting, steam cleaning, or solvent wiping (with an indicated solvent) and shall be specified in writing by the material supplier and followed by the applicator. Any surface coating damaged by moisture or rain shall be removed and redone as directed by the Owner or Engineer.

C. In no case shall paint be applied to surfaces which show a moisture content greater that 14 percent. The presence of moisture shall be determined prior to coating by testing with a moisture detection device such as a Delmhorst Model DLM2E.

3.06 MINIMUM COATING THICKNESS

A. Coating thickness shall meet or exceed the specified minimum dry film thickness (DFT) in all areas. The average coating thickness as determined by multiple representative DFT measurements shall meet or exceed the mid-point of the specified DFT range. If the measured DFT is below this value, the surface shall be recoated with at least the minimum DFT until the total DFT meets or exceeds the mid-point DFT.

B. Coverage rates are theoretical as calculated by the coating manufacturer and are, therefore, the maximum allowable.

C. Apply a prime coat to material which is required to be painted or finished, and which has not been prime coated by others.

D. On masonry, application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, is shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint.

E. Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

3.07 FINISHES

A. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

B. Complete Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specific requirements.

3.08 FIELD QUALITY CONTROL

A. The Contractor shall request acceptance of each coat by the Owner's representative before applying the next coat; and the Contractor shall provide the necessary properly calibrated gauges. All nonferrous surfaces shall be checked for number of coats and thickness by use of a Tooke gauge. All ferrous surfaces shall be checked for film thickness by use of an Elcometer or Micro-Test magnetic dry film gauge properly calibrated. In addition, submerged tank linings and metals shall be tested for freedom from holidays and pinholes by use of a Tinker-Rasor or K-D Bird Dog Holiday Detector. All defects shall be corrected to the satisfaction of the Owner.

3.09 PROTECTION

A. All other surfaces shall be protected while painting.

B. Protection of furniture and other movable objects, equipment, fittings, and accessories shall be provided throughout the painting operation. Remove all electric plates, surface

hardware, etc., before painting; protect and replace when completed. Mask all machinery nameplates and all machined parts not to receive paint. Lay drop cloths in all areas where painting is being done to adequately protect flooring and other work from all damage.

3.10 CLEANING

A. The Contractor shall perform the work under this Section while keeping the premises free from accumulation of dust, debris, and rubbish and shall remove all scaffolding, paint cloths, paint, empty paint containers, and brushes from buildings and the project site when completed.

B. Cleaning: All paint brushed, splattered, spilled, or splashed on any surface not specified to be painted shall be removed.

C. The Contractor shall insure that all glass throughout the facility is cleaned of dirt and paint before he leaves the job site. Further, the Contractor shall insure that all glass is thoroughly washed and polished.

D. Upon completion of the project, the job site shall be left neat and clean.

3.11 EXTRA STOCK

A. Paint To Be Supplied To Owner: Upon completion of painting work, the Owner shall be furnished at no additional cost, unopened containers providing a minimum of one (1) gallon of each type and color of finish paint for touching up. Multi-component coatings shall have each component supplied in separate containers boxed together. Paint container labels shall be complete with manufacturer's name, generic type, number, color, and location where used.

END OF SECTION

SECTION 09901

COATINGS AND LININGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This specification pertains to the coating and lining including but not limited to manholes and lift stations as well as the coating of above ground assets including but not limited to: steel, ductile iron pipe, ductile iron fittings, valves, hydrants, hardware and all appurtenances. Brass, bronze and 316 Stainless Steel shall not be coated.

B. Precast concrete rehabilitation and new structures: The Work shall include the furnishing and installation of an interior protective lining/coating corrosion protection system including all necessary materials, equipment and tools as required for a complete installation in accordance with the manufacturers recommendations. The completed system shall provide a waterproof, corrosion protection system to prevent any deterioration of concrete surfaces from hydrogen sulfide and other corrosive gases/acids produced by wastewater and to prevent infiltration. To ensure total unit responsibility, all materials and installation thereof shall be furnished by, and coordinated with, 1 supplier/manufacturer.

1.02 QUALITY ASSURANCE

A. All work shall be proved to be in first class condition and constructed in accordance with the Drawings and specifications. All defects disclosed by tests and inspections shall be remedied immediately by the Contractor at no expense to the City.

B. Fiberglass liner manufacturers shall certify that the liner has been manufactured, sampled, tested, and inspected in accordance with ASTM D 3753.

C. Polyethylene liner manufacturers shall certify that the liner has been designed and manufactured in accordance with ASTM F 1759 and these specifications.

D. Holiday Testing: Each coat shall be holiday tested at the recommended 100-125 volts DC per mil in accordance with the latest edition of the following standards: NACE SP0188-2006, NACE Standard RP0490, ASTM G62

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the City for review and acceptance prior to construction in accordance with the General Conditions and Submittals specifications.

1.04 COVERAGE

A. The protective lining/coating corrosion protection shall cover all concrete surfaces within

the wetwell or manhole including the adjustment ring area.

B. Coatings and lining surfaces shall be holiday free and all defects shall be repaired in accordance with the manufacturer's recommendations prior to the next coat being applied.

1.05 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C1244: Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.

2. ASTM D3299: Filament-Wound Glass-Fiber Reinforced Thermoset Resin Corrosion-Resistant Tanks.

3. ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

4. ASTM D3753: Glass-Fiber-Reinforced Polyester Manholes and Wetwells.

5. ASTM D6365: Nondestructive Testing of Geomembrane Seams using the Spark Test.

6. ASTM F1759: Design of High-Density Polyethylene (HDPE) Manholes for Sub-surface Applications.

7. ASTM F1869: Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

8. ASTM G62: Standard Test Methods for Holiday Detection in Pipeline Coatings.

B. NACE INTERNATIONAL (Formerly The National Association of Corrosion Engineers)

1. NACE SP0188-2006 (formerly RP0188): Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

2. NACE Standard SP0490-2007 (formerly RP0490): Holiday Detection of Fusion-Bonded Epoxy External Pipeline Coating of 250 to 760 µm (10 to 30-mils).

3. NACE Standard SP0178-2007 (formerly RP0178): Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in the "Approved Manufacturer's List" appended to these technical specifications.

2.02 HDPE LINERS

A. The Work shall include the furnishing and installation of an interior protective liner system including all necessary labor, materials, equipment and tools as required for a complete installation. Liner shall be high-density polyethylene (HDPE). This liner shall provide a waterproof, corrosion resistant liner to prevent any deterioration of concrete surfaces from hydrogen sulfide and other corrosive gases/acids produced by wastewater and to prevent infiltration. To ensure total unit responsibility, all materials and installation thereof shall be furnished by, and coordinated with, 1 supplier/manufacturer.

B. Manhole HDPE Liner shall have a minimum thickness of 2-mm (78-mil) and wetwell HDPE shall have a minimum thickness of 5-mm (195-mil). All HDPE liner sheets shall be extruded with a large number of anchoring studs, a minimum of (420/m^2, 39/ft^2), manufactured during the extrusion process in 1-piece with the sheet so there is no welding and no mechanical finishing work to attach the studs to the sheet. The liner shall have a pull out of 112.5-lbs/anchoring stud. A manufacturer certified fabricator shall custom fit the liner to the formwork in order to protect the concrete surfaces from sewer gases.

C. All welding shall be performed in accordance with the published directives and procedures of the manufacturer and by welders certified by the manufacturer and documentation shall be provided to the City prior to the Work. Completion of welding will provide a 1-piece monolithic HDPE protective liner system that will provide excellent resistance to hydrogen sulfide attack and will not pull off the wall in the event that infiltration occurs. Flat liner sheet, not anchored, used for overlapping joints, shall have a minimum thickness of 3-mm for manholes or 5-mm for wetwells and shall contain a co-extruded bottom surface layer of conductive polyethylene. Conductive cap strip material shall have a free path from the back side of the sheet to a portion of the concrete surface.

D. Field welding of the liner at the riser joints shall be completed only after vacuum testing (ASTM C1244) of the new structure has been completed and any concrete joint deficiencies have been rectified. Vacuum testing is not required on rehabilitation of existing structures.

E. Testing and supervision of the installation and welding shall be performed by qualified staff only and must be checked when completed by visually checking and by Spark Testing all welded joints per ASTM D6365. Holiday testing 20,000 to 35,000 volts.

All high voltage discontinuity (spark) testing shall be performed using a Tinker & Rasor model AP/W Holiday Detector or equal.

F. Penetrations (Forcemain, conduit, etc) shall have an internal boot comprising of minimum of 3/8-inch 316SS band clamp compressing a 2-inch wide neoprene with full circumferential welded boot around each penetration in accordance with the manufacturer's details.

2.03 PREFORMED POLYPROPYLENE (PP) LINERS

A. The Work shall include the furnishing and installation of an interior protective liner system including all necessary labor, materials, equipment and tools as required for a complete installation. This liner shall provide a waterproof, corrosion resistant liner to prevent any deterioration of concrete surfaces from hydrogen sulfide and other corrosive gases/acids produced by wastewater and to prevent infiltration. To ensure total unit responsibility, all materials and installation thereof shall be furnished by, and coordinated with, 1 supplier/manufacturer.

B. All joints shall be field welded by hot air extrusion welding with PP welding bead. Field welding of the PP liner at the riser joints shall be completed only after vacuum testing (ASTM C1244) of the new structure has been completed and any concrete joint deficiencies have been rectified. Vacuum testing is not required on rehabilitation of existing structures.

C. Testing and supervision of the installation and welding shall be performed by qualified staff only and must be checked when completed by visually checking and by Spark Testing all welded joints per ASTM D6365. Holiday testing 20,000 to 35,000 volts. All high voltage discontinuity (spark) testing shall be performed using a Tinker & Rasor model AP/W Holiday Detector or equal.

D. Penetrations (Forcemain, conduit, etc) shall be gasketed PP pipe bell connectors or PP sleeves for boot type connectors and shall be attached to the PP liner by hot air extrusion welding with PP welding bead in accordance with the manufacturer's details.

2.04 FIBERGLASS LINERS

A. Fiberglass liners shall be used for new or existing precast manholes and wetwells. Fiberglass liners shall meet or exceed ASTM D 3753 and shall withstand ASSHTO H-20 Loading.

B. FRP liner shall be 1-piece with no vertical or horizontal seams allowed. The FRP shall be fabricated in accordance with NBS PS 15-69, and shall consist of commercial grade polyester resin, UV inhibitor, chopped strand, woven roving, and continuous reinforcement. Minimum liner thickness shall be 1/2-inch for all diameter wells, and shall not have external ribs. Liner size shall be field verified by liner manufacturer's representative. Tolerance of the inside diameter shall be +/- 1% of the required liner diameter.

C. Exterior Surface: The exterior surface shall be relatively smooth with no sharp projections and shall be free of blisters larger than 1/2-inch in diameter, delamination and fiber show. Hand work finish is acceptable if enough resin is present to eliminate fiber show.

D. Interior Surface: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, and blisters larger than 1/2-inch in diameter, and wrinkles of 1/8-inch or greater in depth. Surface pits shall be permitted up to 6 per square feet if they are less than 3/4-inch in diameter and less than 1/16-inch deep. Voids that cannot be broken with finger pressure and that are entirely below the resin surface shall be permitted if they are less than 1/2-inch in diameter and less than 1/16-inch thick.

E. Physical Properties:

Property	Hoop Direction	Axial Direction
a. Tensile Strength (psi)	18,000	5,000
b. Tensile Modules (psi)	0.6 x 10e	0.7 x 10e
c. Flexural Strength (psi)	26,000	4,500
d. Flexural Modules (psi)	1.4 x 10e	0.7 x 10e
e. Compressive Strength (psi)	18,000	12,000

F. Stiffness

Liner Length in FT.	PSI
3 – 6.5	0.75
7 – 12.5	1.26
13 – 20.5	2.01
21 – 25.5	3.02
26 – 35	5.24

G. Testing: All tests shall be performed as specified in ASTM D3753 latest edition, Section 8. Test method D-790 (note 5) and test method D695. Each completed liner shall be examined for dimensional requirements, hardness and workmanship. All required ASTM D3753 testing shall be completed and records of all testing provided to the City. As a basis of acceptance, the manufacturer shall provide an independent certification which shall consist of a copy of the manufacturer's test report, and be accompanied by a copy of the test results that the liner has been sampled, tested and inspected in accordance with the provisions of this specification and meets all its requirements. The independent certification and manufacturer's test report shall be provided to the City prior to delivery of the Liner.

H. Connections: Openings for pipe connections will be core drilled in the field. Pipes shall be placed through concrete wetwell and fiberglass liner in the locations indicated on the Drawings. Pipes shall then be grouted in place with the grout filling the entire void and being as thick as the concrete wetwell. The pipe on the interior of the wetwell shall be fiberglassed to the fiberglass liner. To fiberglass the PVC or Ductile Iron pipe to the fiberglass liner, the surface to be fiberglassed must first be sanded.

In the case of Ductile Iron pipe, the protective coating on the exterior of the pipe must be removed and then the pipe sanded. After sanding and cleaning the area to be fiberglassed, apply a coat of primer resin. When the resin becomes tacky, begin normal installation of the fiberglass, taking care to roll out all of the air pockets. All field

fiberglassing must be accomplished by a manufacturer certified installer. Submit certification to the City.

I. Fiberglass Reinforced Top: The fiberglass manhole liner top shall be fabricated using fiberglass material as above. Material and installation to meet all physical requirements as above. Top to be attached to wetwell liner pipe with fiberglass layup to comply with ASTM D3299. When reinforcement is necessary for strength, the reinforcement shall be fiberglass channel laminated to the inside of the liner top and shall comply with ASTM D3299. 4,000-psi concrete shall be poured around the entire manhole fiberglass cone section. Lift station top slabs shall be re-poured with HDPE interior liner. Contractor shall ensure an airtight connect between the Pump Station HDPE lined top slab and interior wetwell liner.

J. PVC stub-outs shall be factory installed for new installations to accept approved boots for gravity lines or compression seals for force mains.

2.05 FERROUS METAL SURFACES (INCLUSIVE OF STEEL AND DIP, HYDRANTS, FITTINGS AND APPURTENANCES)

Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, Contractor shall comply with the manufacturer's minimum recommendations. All cleaning, surface preparation, coating application, thickness, testing, and coating materials (where available) shall be in accordance with the referenced standards of AWWA, ANSI, NACE, SSPC, NSF, and ASTM. Color-coding shall be Safety Blue, Safety Green and Pantone Purple 522-C for water, wastewater and reclaimed water respectfully. Surfaces shall be holiday detected in accordance with ASTM G 62. Areas found to have holidays shall be marked and repaired in accordance with the paint manufacturer's instructions. The City shall be notified of time of testing so that he might be present to witness testing.

A. Procedures for Coating Exterior of DIP, Hydrants, Fittings and Appurtenances:

1. Surface Preparation: Do not abrasive blast or prepare more surface area than can be coated in the same day; prepare surfaces and apply prime coatings within an 8-hour period.

a. Steel: Shall require NACE-1/SSPC-SP5 White Metal Blast Cleaning minimum angular anchor profile of 1.5-mils. White metal blast cleaning removes all of the coating, mill scale, rust, oxides, staining, corrosion products, and other foreign matter from the surface.

b. DIP: DIP with asphaltic seal coat, Hydrants, FBE (Valves and appurtenances), Shall require NACE-3/SSPC-SP6 Commercial Blast Cleaning minimum angular anchor profile of 1.5-mils. Commercial blast cleaning removes all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter from all surfaces and allows stains to remain on 33% (percent) of each unit area of surface.

c. Note: Primer Option - Hydrants, FBE (Valves and appurtenances), existing factory coatings: Where specifically called out in the Coating System Table below, NACE-4/SSPC-SP7 may be substituted for the commercial blast for hydrants and factory applied FBE (Valves and appurtenances) where the coating manufacturer has specifically provided compatible coatings with existing coatings including urethane, epoxy, alkyd and water-based coatings. Under no circumstances shall DIP with asphaltic seal coat be over-coated. NACE-4/SSPC-SP7 Brush-Off Blast Cleaning shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose coating. Tightly adherent mill scale, rust, and coating may remain on the surface. Mill scale, rust, and coating are considered tightly adherent if they cannot be removed by lifting with a dull putty knife after abrasive blast cleaning has been performed.

2. Contaminants: Remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating in accordance with SSPC-SP1 for the substrate and between each coating layer.

3. Temperature: Surface temperature of substrate shall be a minimum of 5°F above the dew point and rising and generally between 40°F to 100°F. Temperatures shall not exceed manufacturer's recommendations.

4. Stripping: Edges, corners, crevices, welds, and bolts shall be given a brush coat/stripe coat for each material/layer. The stripe coat shall be applied by a brush and worked in both directions.

5. Coatings Systems: Two (2) options for coating systems are provided. Each coat shall be a distinctive color or shade to verify each coating in the system.

6. Prime coat: DIP, DIP with asphaltic seal coat, Hydrants, FBE (Valves and appurtenances) prime coat shall be zinc-rich. Zinc-rich shall only be used on bare metal. Factory applied FBE/Asphaltic/Mastic coatings on valves and appurtenances shall be completely removed per NACE 3 / SSPC-SP6.

7. Note: Where specifically called out in the Coating System Table for factory applied FBE (Valves and appurtenances) surface preparation may be NACE-4/SSPC-SP7 and the prime coat shall be an Inorganic water based epoxy. Asphaltic seal coats and mastics shall not be overcoated with Inorganic water based epoxy.

8. Intermediate coat: Varies per coating system.

9. Final Coat: Varies per coating system.

10. Holiday Testing: Each coating layer shall be holiday tested at the recommended 100-125 volts DC per mil in accordance with the latest edition of the following standards: NACE SP0188-2006, NACE Standard RP0490, ASTM G62 and per the manufacturers recommendations. All low voltage holiday testing shall be performed using a Tinker & Rasor model M-1 Holiday Detector or equal.

11. Coating Systems: Either System 1 or System 2 shall be used for above ground, non-immersion ferrous metal surfaces (Inclusive of Steel, DIP, Hydrants, Fittings and Appurtenances).

Color Codes

Generic Name	Application	Tnemec	Carboline	PPG / Ameron
Safety Blue	Water Master Meters	True Blue / Safety 11SF	9122	BL Safety Blue
Safety Green	Pump Station Piping	Hunter Green 08SF	V358	GN Safety Green
Pantone Purple 522C	Reclaimed Master Meters	Purple Rain / Safety 14 SF	7528	PL Safety Purple
Safety Green	Hydrant Bonnet & Caps	Hunter Green 08SF	V358	GN Safety Green
Safety Orange	Hydrant Bonnet & Caps	Tangerine Orange / Safety 04 SF	1420	OR 2Safety Orange
Safety Red	Hydrant Bonnet & Caps	Candy Apple Red / Safety 06SF	7573	RD 2 Safety Red
Safety Silver	Hydrant Barrel	Aluminum 57GR	J766	SL Safety Silver

System 1 - Zinc / Urethane / Fluoropolymer

Description	Generic Coating Name	Tnemec	DFT mils	Carboline	DFT mils
Prime Coat all materials. Surface Prep NACE 1 or NACE 3	Zinc-Rich	Zinc Series 90-97	2.5 - 3.5	Carbozinc 621	3.0 - 8.0
Prime Coat - option for FBE or Hydrants only. Surface Prep NACE 4	Inorganic water based epoxy – overcoat existing coatings	Typoxy Series 27WB	4.0 - 14.0	NA	NA
Intermediate Coat.	Aliphatic Acrylic Polyurethane	Endura-Shield Series 73	2.0 - 3.0	Carbothane 133 HB	3.0 - 5.0
Final Coat.	Advanced Thermoset Fluoropolymer Polyurethane	Hydroflon Series 700	2.0 - 3.0	Carboxane 950	2.0-3.0

System 2 - Zinc / Epoxy / Urethane

Description	Generic Coating Name	Tnemec	DFT mils	Carboline	DFT mils	PPG / Ameron	DFT mils
Prime Coat all materials. Surface Prep NACE 1 or NACE 3	Aromatic Urethane, Zinc-Rich	Zinc Series 90-97	2.5 - 3.5	Carbozinc 621	3.0 - 8.0	Amerco at 68HS	3

Prime Coat option for FBE, Hydrants. Surface Prep NACE 4	Inorganic water based epoxy – overcoat existing coatings	Typoxy Series 27WB	4.0 - 14.0	NA	NA	NA	NA
Intermediate Coat.	Polyamidoamine Epoxy	Color Hi-Build Epoxoline II Series N69	4.0 - 10.0	Carboguard 60	4.0 - 6.0	Amerlock 2/400	4.0 - 6.0
Final Coat.	Aliphatic Acrylic Polyurethane	Endura-Shield Series 73	2.0 - 3.0	Carboxane 950	2.0 - 3.0	Amercoat 450H	2.0 - 3.0

2.06 SPECIALTY COATINGS

A. The Specialty Coatings are for rehabilitation of existing precast concrete manholes. New precast structures shall be lined only. All specialty coatings applicators shall follow the procedure as outlined below:

1. Pre-Inspection: Applicator shall take appropriate action to comply with all local, state and federal regulations including those set forth by OSHA, EPA, the City and any other applicable authorities. Prior to conducting any work, perform inspection of structure to determine need for protection against hazardous gases or oxygen-depleted atmosphere and the need for flow control or flow diversion.

2. Bypass plan: Bypass plan for flow control or bypass shall be submitted to the City for approval prior to conducting the work. 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 until final applications are cured as recommended by the corrosion protection system manufacturer.

3. Surface Preparation: NACE 6/SSPC-SP13 "Surface Preparation of Concrete." Dry abrasive blasting, wet abrasive blasting, vacuum-assisted abrasive blasting, and centrifugal shot blasting, high pressure water cleaning (5,000 to 10,000-psig), water jetting (10,000 to 30,000-psig) or combination of methods to remove deteriorated concrete, brick or mortar, laitance, hard contaminants, existing coatings, localized micro-organisms and gas contaminants from the concrete walls, floor, ceiling, and other concrete surfaces and shall display a surface profile suitable for application of the system. Minimum surface profile shall be ICRI CSP-5 or greater. Containment shall be provided to capture spent abrasive material and deteriorated concrete for removal by the Contractor.

4. Substrate Inspection: After completion of surface preparation, the Contractor shall inspect for: Leaks, Cracks, Holes, Exposed Rebar, Ring and Cover Condition, Invert Condition, Inlet and Outlet Pipe Condition. After the defects in the structure have been identified, repair with a manufacturer approved underlayment or material to assure proper rehabilitation of the surface defect

and compatibility with the specialty coating system product to be applied. Repairs to exposed rebar, defective pipe penetrations or inverts, shall be recommended by the specialty coating manufacturer and approved by the City prior to proceeding with the repair. Final preparation and cleaning of repaired surfaces is required prior to application of the coating and shall comply with the corrosion protection system manufacturer's recommendations.

5. Manufacturer's certification: Applicators, installers, welders and application equipment shall be certified by the manufacturer of the corrosion protection system and documentation shall be provided to the City prior to the work.

6. Area to be coated: All exposed concrete of the entire interior surface of precast structure including but not limited to benching, pipe penetrations, walls, bottom of top slab, chimney, etc. Flow channel inverts are not necessary to coat. Corrosion protection system shall interface with adjoining construction materials/components throughout the manhole structure to effectively seal and protect substrates from attack by corrosive elements and to ensure the effective elimination of infiltration into the sewer system.

7. Application: Application of specialty coating system shall be in strict accordance with manufacturer's recommendation. Specified surfaces should be shielded to avoid exposure of direct sunlight, other intense heat source or, where cementitious products are employed, excessive ventilation. Where varying surface temperatures do exist, coating installation should be scheduled when the temperature is falling versus rising. Verification of the corrosion protection system thickness shall be verified during application via wet gauge methods or following cure of the system using appropriate non-destructive or destructive methods.

8. Holiday Testing: Cure time shall be in accordance with the Manufacturers product data sheet. Final concrete structure corrosion protection system shall be completely free of holidays, pinholes or voids. High voltage Holiday testing shall be required and holidays marked and repaired with same material and to same thickness as required of original installation. All high voltage discontinuity (spark) testing shall be performed using a Tinker & Rasor model AP/W Holiday Detector or equal and at 100-125 volts DC per mil or per the manufacturers recommendations.

9. Destructive Testing: Destructive testing may be performed as directed by the City to verify coating adhesion and coating DFT. Repairs to areas tested by destructive means shall be repaired by the certified applicator at the Contractor's expense.

10. Reporting: Provide final written report to the City detailing the location, date of report, description of repair or original installation and manufacturer data and cut sheets of the corrosion protection system and applicable testing results as per sections 7, 8 and 9.

11. Warranty: The report shall contain a copy of the warranty.

B. System SC-1: Sauereisen Sewergard 210 (Trowelable), 210FS (Trowelable Fast Set), 210S (Sprayable) or 210RS (Rotary Spray) shall be applied and then shall be finished with a coat of Sauereisen Sewergard Glaze 210G. The lining system to be utilized shall be an epoxy mortar or aggregate filled epoxy. Material furnished under this specification shall be a pre-packaged from the manufacturer. Materials shall be trowel applied or sprayed and shall conform to the Manufactures product data sheet as supplied by the manufacturer.

1. Additional Preparation: To ensure a good bond, the newly blasted surface shall be thoroughly vacuumed to remove all sand and debris and surface shall be dry prior to application.

2. Surfacer for Rehabilitation/repair: Substrate in requiring repairs in excess of 1/8-inch shall be repaired with Sauereisen Underlayment No F-120, F-121 or F-209 Filler prior to application of protective lining/coating corrosion protection system.

3. Thickness:

   a. Sewergard 210 / 210FS / 210RS: The material shall be applied in 1 or more layers for a total thickness of minimum of 125-mils DFT (1/8-inch). After application, the material shall be damp rolled with excess water shaken off prior to back rolling.

   b. Sprayable 210S: The material shall be applied in 1 or more layers for a total thickness of minimum of 60-mils shall be required for the Spray applied 210S.

4. Finishing Glaze: After application, and curing of either the 210, 210FS, 210RS or 210S, the material shall be coated with a minimum of 20-mils of Sauereisen Sewergard Glaze 210G by roller or spray application in accordance with the manufacturers recommendations.

5. Holiday Testing: The protective lining/coating protection system shall be cured in accordance with the manufacturer's recommendations prior to holiday testing at a minimum of 14,500 volts.

A. System SC-2: Tnemec Perma-Shield Coating System.

B. Additional Preparation: To ensure a good bond, the newly blasted surface shall be thoroughly vacuumed to remove all sand and debris and surface shall be dry prior to application and surface shall be minimum 5°F above the dew point. Moisture content not to exceed 3-pounds per 1,000 square feet in a 24-hour period verify dryness using a "plastic film tape-down test" ASTM D4263 and perform Anhydrous Calcium Chloride ASTM F1869.

1. Surfacer for Rehabilitation/repair: Substrate in requiring repairs in excess of 1/8-inch shall be repaired Series 217 or 218 Filler prior to application of protective lining/coating corrosion protection system. Concrete surface shall be pre-wet or dampened with potable water prior to surfacer application.

2. Thickness: Lining Series 434: The material shall be applied in 1 or more layers for a total thickness of minimum of 125-mils DFT (1/8-inch).

3. Finishing Glaze: After application, and curing, the material shall be coated with 15- 20-mils of Series 435 in accordance with the manufacturer's recommendations.

4. Holiday Testing: The protective lining/coating protection system shall be cured in accordance with the manufacturer's recommendations prior to holiday testing at a minimum 14,500 volts.

C. System SC-3: Sewercoat (PG and 2000 HS) Calcium aluminate mortar: The lining system to be utilized shall be 100% calcium aluminate cement with 100% calcium aluminate aggregate. Materials shall be spray applied by either a wet gunning (low-pressure spray) or dry gunning (shotcrete) method and shall conform to the manufacturer's product data sheet as supplied by the manufacturer. The equipment shall be clean and free of any hydrated or un-hydrated Portland Cement.

1. Additional Preparation: To ensure a good bond, the newly blasted surface shall be fully saturated with water prior to application.

2. Thickness: The material shall be applied in 1 or more layers to such total thickness as required. A minimum of 1-inch shall be applied.

3. Finishing: After spraying, the material shall be brushed or trowel finished.

4. Curing: Curing by appropriate methods (curing compound, water mist, etc.) should be implemented as the surface begins to harden and dry (as early as 1-hour after application).

D. System SC-4: Raven 405: System shall be 100% solids epoxy. Thinning with solvents shall not be permitted. Surface preparation, mixing, pot life, ambient conditions, application, film thickness per coat, cure time, and recoat time shall be in accordance the manufacturer's recommendations.

1. Applicator/installer shall be certified by the Manufacturer.

2. Surfacer/Repair: Raven 710, 705CA or Raven 700 shall be spray applied or trowelled to repair/fill minor surface defects or applied as an underlayment.

3. Primer: Concrete exhibiting a moisture vapor emission rate greater than 3-lbs/1,000 square feet/24-hours, when tested according to ASTM F1869, shall be primed with Raven 155. Raven 155 primer (2 component waterborne epoxy) shall be applied at a maximum of 8-mil WFT (3-mil DFT). Recoat window minimum 2-4-hours at 72°F with maximum 72-hours at 72°F.

4. Top Coat: Raven 405 shall be applied with an approved plural component airless spray system. Coating thickness shall be in relation to the profile of the surface to be coated as recommended by the coating product manufacturer. In all cases the coating shall be applied with minimum of 2 coats applied at 40-80-mils WFT/DFT each for minimum final film thickness at 125-mils DFT. Subsequent top coating or additional coats of the coating product(s) shall occur within the product's recoat window: minimum cure to a tacky state; maximum cure of 18-hrs at 72ºF substrate temperature. Additional surface preparation procedures will be required if this recoat window is exceeded including inspection for and removal of amine blush and/or other potential contaminants.

5. Holiday Testing: The protective lining/coating protection system shall be cured in accordance with the manufacturer's recommendations prior to holiday testing at a minimum of 12,500 volts.

E. SC-5: Spectrashield Multicomponent Liner System. Spectrashield multi-component stress panel liner system composed of moisture barrier (modified polymer), surfaces (polyurethane/polymeric blend foam) and final barrier coat (modified polymer). The system is applied in three-steps and the applicator/installer shall be certified by the Manufacturer.

1. Application

a. Moisture barrier: Silicone Modified Polyurea Minimum 40-mils DFT.

b. Surfacer: Polyurethane/Polymeric blend foam.

c. Final corrosion barrier: Silicone Modified Polyurea Minimum 60-mils DFT.

2. Film Thickness: Final installation shall be a minimum of 500-mils. A permanent identification and date of work performed shall be affixed to the structure in a readily visible location.

3. Holiday Testing: The protective lining/coating protection system shall be cured in accordance with the manufacturer's recommendations prior to holiday testing at a minimum of 50,000 volts.

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE

A. All materials shall be delivered to the job in original sealed and labeled containers of the coating manufacturer, and shall be subject to inspection by the City. Labels shall show name of manufacturer, type of coating, formulation, date, color and manufacturers recommendations. Coatings manufacturer date shall not exceed the manufacturer's recommendations for storage and useful life and Coatings manufactured in excess of 1-year prior to application shall be rejected.

B. Oil and grease shall be completely removed in accordance with SSPC-SP1 before beginning any other surface preparation method. Surfaces of welds shall be scraped and ground as necessary to remove all slag and weld spatter.

C. All components of equipment that can be properly prepared and coated after installation shall be installed prior to surface preparation. Components that will be inaccessible after installation shall have the surfaces prepared and coated before installation.

D. All ferrous metal surfaces shall be free of all defects and have all sharp edges, welds, slag, defects and weld splatter ground smooth in accordance with NACE Standard RPO178.

E. Edges, corners, crevices, welds, and bolts shall be given a brush coat (stripe coat) for each coating. The stripe coat shall be applied by a brush and worked in both directions. Special attention shall be given to filling all crevices with coating.

F. Coating shall be applied in a neat manner that will produce an even film of uniform and proper thickness, with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be carefully examined and faulty material, poor workmanship, holidays, damaged areas and other imperfections shall be touched up prior to applying succeeding coats. Each coat shall be thoroughly dry and hard before the next coat is applied in accordance with the coating manufacturer's recommendations for drying time between coats. In no case shall coating be applied at a rate of coverage greater than the maximum rate recommended by the coating manufacturer. Each coat shall be uniform in coverage and color. Successive coats shall perceptibly vary in color.

G. Coating failures will not be accepted and shall be entirely removed down to the substrate and the surface recoated. Failures include but are not limited to holidays, sags, checking, cracking, teardrops, fat edges, fisheyes, or delamination.

H. Surfaces not required to be coated: Brass, Bronze, Stainless steel (Not including SS bolts and nuts)

3.02 INSPECTION FOR ACCEPTANCE

A. The quality of materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the City. Such inspection may be made at the place of manufacture, at the site after delivery or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. Sections that have been damaged after delivery will be rejected and if already installed removed and replaced, entirely at the Contractor's expense.

B. At the time of inspection, the sections will be carefully examined for compliance with the specified ASTM designation and with the approved manufacturer's drawings. Sections shall be inspected for general appearance, dimension, "scratch-strength" blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

C. Precast concrete structures shall be inspected by the City and defective materials shall replaced by the Contractor at the Contractor's expense.

D. Any repairs made on surfaces shall be holiday detected. Areas found to have holidays shall be marked and repaired in accordance with the coating manufacturer's instructions. The City shall be notified of time of testing so that he might be present to witness testing.

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SECTION 09909

RAVEN PROTECTIVE CONCRETE COATING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish all materials, labor, equipment, and incidentals required to provide the protective concrete coating to all surfaces of the wet well structure.

B. General Design: The protective coating shall be intended for applications in domestic wastewater wetwells and manholes. The coating shall be compatible with the repair mortars or concretes used for the rehabilitation of the wetwell and manholes. The protective coating shall be capable of contact with a minimum of 20% sulfuric acid solution without any degradation of physical and performance properties.

C. Contractor shall adhere to this coating specification

1.02 QUALITY ASSURANCE

A. Qualifications:

1. The manufacturer and/or applicator of the total coating system of wastewater containment structures shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for wetwells and manholes. Applicator shall be completely trained in leak repair, surface preparation and corrosion materials application on manholes and pump station wet wells. Materials/products shall be suitable for installation in a sever hydrogen sulfide environment without any deterioration to the coating.

2. The applicator shall be trained and certified by the manufacturer for the handling, mixing, application and inspection of the coating system as described herein.

3. To ensure total unit responsibility, all materials and installation thereof shall be furnished and coordinated with/by one supplier/applicator who turnkeys the work and assumes full responsibility for the entire operation. Manufacturer must have minimum ten (10) years of manufacturing experience and applicator must be certified for minimum of five (5) years.

B. Manufacturers: The protective concrete coating shall be:

1. Raven Coating Systems

C. Warranty: The coating manufacturer shall warrant the Raven coating against failure for a period of 10 years. "Failure" will be deemed to have occurred if the protective coating

fails to (a) prevent the internal damage or corrosion of the structure, (b) protect the substrate and environment from contamination by wastewater, or (c) product does not meet the physical properties or is defective in manufacture. If any such failure occurs within 10 years of initial completion of work on a structure, the damage shall be repaired to restore the coating at no cost to the Owner within 60 days after written notification of the failure.

1.03 SUBMITTALS

A. Shop drawings: Submit shop drawings in accordance with Division 0 and 1. Shop drawings shall include all information required to demonstrate full compliance with this Specification. The following shall be submitted as a minimum.

1. Technical data sheet on each product used/coating properties.

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. ASTM References.

5. CIGMAT evaluation.

6. Descriptive literature, bulletins and or catalogs of materials.

7. Work procedures including flow diversion plan, method of repair, etc.

8. Material and method for repair of leaks or cracks in manholes.

9. List of reference projects.

10. Certification of applicator.

11. Applicators reference of similar projects.

12. Application procedures, including repair procedures.

13. Compatibility with repair mortar certification.

14. Final installation report on completed project.

1.04 DELIVERY, HANDLING, AND STORAGE

A. Deliver all materials to the job site in original, unopened packages and containers bearing manufacturer's name and label.

1. Provide labels on each container with the following information:

a. Name or title of material.

b. Fed. Spec. number if applicable.

c. Manufacturer's stock number, date of manufacture and expiration date (shelf life).

d. Manufacturer's formula or specification number.

e. Manufacturer's batch number.

f. Manufacturer's name.

g. Generic type.

h. Contents by volume, for major pigment and vehicle constituents.

i. Application instructions: thinning, ambient conditions, etc.

2. Containers shall be clearly marked to indicate any hazards connected with the use of the paint and steps which should be taken to prevent injury to those handling the product.

B. All containers shall be handled and stored in such a manner as to prevent damage or loss of labels or containers.

PART 2 - PRODUCTS

2.01 GENERAL

A. The materials to be utilized in the coating of wet well, splitter structure and influent channel area shall be designed and manufactured to withstand the severe effects of hydrogen sulfide and sulfuric acid in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the coating products utilized and shall have a satisfactory installation record.

B. Existing coatings shall be removed which may affect the performance and adhesion of the specified coating product(s).

Contractor is to maintain strict adherence to the protective coatings manufacturer's recommendations with regard to proper surface preparation and compatibility with existing coatings.

C. Thoroughly clean and prepare existing products/surfaces to effect a seal with and promote the adhesion of the coating product(s).

2.02 REPAIR PRODUCTS

A. Repair products shall be used to fill voids or bugholes, smooth transitions between components, replace lost mortar in masonry structures, smooth rough surfaces, and rebuild severely deteriorated substrates and/or to remediate infiltration prior to the installation of the coating product(s). All repair must result on uniform even surface.

B. Repair materials must be supplied by the coating product(s) manufacturer or shall be expressly approved by the manufacturer. All materials shall be mixed, applied, and cured in accordance with the manufacturer's recommendations. The following is a list of approved repair products.

1. 100% solids, solvent-free epoxy grout; specifically the specified coating product(s) enhanced with Raven 200 polyolefin fiber filler or other approved aggregate.

2. Factory blended, rapid setting, high-early strength, non-shrink, repair mortar to be trowel or pneumatically spray applied to the entire surface.

   a. Manufacturer: Raven Coating Systems, Broken Arrow, Oklahoma 800-324-2810 or 918-6150-140 fax.

   b. Product: Raven 755 Cement Mortar having the following characteristics:

      i. Product Type: Fiber filled high early strength Portland cement mortar
      ii. Tensile Strength, psi (ASTM C496):>800
      iii. Compressive Strength, psi (ASTM C109): >9,000 @ 28 days
      iv. Flexural Strength, psi (ASTM C293): >1500
      v. Shrinkage @ 90% R. H., % (ASTM C596): 0
      vi. Adhesion to Concrete, psi (ASTM C882): >2000 psi
      vii. Freeze/Thaw (ASTM C666): 100 Cycles, no visible damage

3. Factory blended, high strength, non-shrink, cementitious repair mortar to be troweled or otherwise manually applied to repair/fill minor surface defects from featheredge to ¼" in thickness.

   a. Manufacturer: Raven Coating Systems

   b. Product: Raven 710 – Cement Mortar having the following characteristics:

i. Product Type: Calcium aluminate mortar
ii. Compressive Strength, psi (ASTM C109): >5,000 @ 28 days
iii. Shrinkage @ 90% R. H., % (ASTM C596): 0
iv. Adhesion to Concrete, psi (ASTM C882): >1600 psi
v. Adhesion to Concrete, psi (ASTM D7234): >150 psi

4. Factory blended, high-early strength, non-shrink, cementitious repair mortar to be trowel applied to fill large voids or repair bench and inverts.

a. Manufacturer: Raven Coating Systems

b. Product: Raven 700 Cement Mortar having the following characteristics:

i. Product Type: Calcium aluminate mortar
ii. Compressive Strength, psi (ASTM C109): >1,800 @ 24 hours
iii. Adhesion to Concrete, psi (ASTM C882): >1600 psi
iv. Adhesion to Concrete, psi (ASTM D7234): >150 psi
v. Density of wet mix: 100 – 110 lbs./ft3.

5. Factory blended, non-shrink, hydraulic cement to be used for infiltration remediation.

a. Manufacturer: As applicable

b. Product: Hydraulic cement having the following characteristics:

i. Product Type: Hydraulic cement
ii. Compressive Strength, psi (ASTM C109): >1,000 @ 1 hour, >2500 psi @ 24 hours
iii. Shrinkage @ 90% R. H., % (ASTM C596): 0

6. Hydrophobic or Hydrophilic injectable urethane chemical grout to be used for the remediation of high volume infiltration or crack repair and/or soil stabilization and void filling.

a. Manufacturer: As applicable

b. Product: Urethane chemical grout as appropriate for infiltration, crack repair and soil stabilization.

2.03 COATING PRODUCTS

A. Coating product shall be applied to all interior surfaces of wet well, splitter structure and influent channel room to protect the host substrate and repair materials from all forms of chemical or bacteriological attack typically found in municipal sanitary sewer systems and to impart a degree of structural enhancement.

B. Coating product physical properties shall be substantiated through submittal of accredited third party testing results and shall be representative of the actual field applied product and cure mechanism(s) to be employed in the field.

C. Primer Coat

a. Product: Raven 171 – Water borne epoxy primer

b. Product Type: 100% solids ultra-high build epoxy primer specifically designed for accelerated cure and suitable for release of flow in less than 45 minutes at normal service temperature or as otherwise detailed.

D. Finish Coat

1. Raven 405 – 100% solids, solvent-free ultra-high build epoxy system exhibiting the following characteristics:

a. Product Type: amine cured epoxy

b. VOC Content (ASTM D2584): 0%

c. Compressive Strength, psi (ASTM D695): 18,000 (minimum)

d. Tensile Strength, psi (ASTM D638): 7,500 (minimum)

e. Flexural Modulus, psi (ASTM D790): 700,000 (minimum)

f. Adhesion to Concrete, psi/mode of failure (ASTM D4541/7234): 200 psi (minimum) with substrate (concrete) failure

g. Chemical Resistance (ASTM D543/G20) immersion service for:
Municipal sanitary sewer environment
Sulfuric Acid, 30%
Sodium Hydroxide, 10%
Sodium Hypochlorite, 12.5%

E. In all cases the coating product(s) shall be applied to a minimum dry film thickness of 125 mils.

2.04 PRODUCT APPLICATION EQUIPMENT

A. Cementitious repair products for spot repair may be mixed and applied using hand and/or power tools

B. Cementitious repair products to be spray applied shall be mixed and applied using manufacturer approved batch mixing and low velocity spray devices.

C. Coating product primer may be applied using hand tools or other convention/airless spray application device(s).

D. Coating product to be spray applied shall be mixed and applied using manufacturer approved heated plural component spray equipment.

E. Coating product application too hard to reach areas or for touch-up may be performed using hand tools.

PART 3 - EXECUTION

3.01 INSPECTION

A. Applicator shall take appropriate action to comply with all local, state and federal regulations including those set forth by OSHA, EPA, the Owner and any other applicable authorities.

B. Prior to conducting any work, perform inspection of structure to determine need for protection against hazardous gases or oxygen depleted atmosphere and the need for flow control or flow Diversion.

C. Submit plan for flow control or bypass to Owner/Engineer for approval prior to conducting the work.

D. New Portland cement structures shall have endured a minimum of 28 days since manufacture prior to commencing installation of the coating system.

3.02 REPAIRS AND SURFACE PREPARATION

A. Excessive debris, sediment, root intrusion or other foreign materials which may impact the effectiveness of the surface preparation process shall be removed prior to the commencement thereof.

B. Offset structural components, lids, covers, frames, etc. shall be repaired, replaced, or reset prior to the commencement of surface preparation.

C. External soil/fill voids shall be remediated and/or stabilized by replacement or injection of stabilizing grout as determined appropriate by the engineer.

D. 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 in accordance with SSPC-SP 1 – Solvent Cleaning.

E. 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 the required cleanliness and profile of the prepared surface to receive the repair and/or coating product(s).

F. Surface preparation method, or combination of methods, that may be used include high-pressure water cleaning, water jetting, abrasive blasting, shotblasting, grinding, scarifying, detergent water cleaning, hot water cleaning and others as referenced in industry accepted standards such as:

1. SSPC SP-13/NACE No. 6 Surface Preparation of Concrete.

2. ASTM D-4258 Standard Practice for Surface Cleaning Concrete for Coating and ASTM-D-4259 Standard Practice for Abrading Concrete.

3. ICRI Technical Guideline No. 03732 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

4. NACE/SSPC Standards for the surface preparation of steel.

G. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound, clean, and neutralized surface suitable for the specified coating product(s).

1. Resulting surface profile of the prepared concrete substrate shall be (as described in ICRI Technical Guideline No. 03732):

a. For application of cementitious materials; at least a CSP2

b. For application of coating products: at least a CSP2.

2. Concrete and/or mortar damaged by corrosion, chemical attack or other means of degradation shall be removed so that sound substrate remains,

a. In conditions where severe chemical/microbiological attack has occurred the prepared substrate shall exhibit a pH of 8-12. Additional cleaning and/or contaminated substrate removal may be required to achieve the specified pH level.

3. Steel surfaces to be coated shall be abrasive blast cleaned.

a. Blast air shall be free of oil and water.

b. Abrasive shall be as required to produce the specified level of cleanliness and profile in an efficient and uniform manner. Abrasive shall not be recycled.

c. Abrasive blasting shall not be performed when the air or steel temperature is below 40 deg F, when the relative humidity exceeds 80%, or when the steel is less than 5 deg F warmer than the dew point. The Contractor will provide dehumidification, and/or temperature control as necessary to meet these conditions.

d. Blast cleaning shall be in accordance with SSPC-SP 5, White Metal Blast Cleaning for immersion service of the coated areas. Blast cleaning for other surfaces shall be in accordance with SSPC-SP 10, Near White Blast Cleaning. Anchor profile shall be 2.5-5.0 mils and relative to the coating thickness specified.

e. Alternatively, surfaces to be recoated may be cleaned according to SSPC-SP 12/NACE No. 5 Surface Preparation and Cleaning of Metals by Water jetting prior to Recoating.

1. At the time of the recoating, the amount of flash rust shall be no greater than “No Flash Rust” as defined in SSPC-SP 12.

H. Prior to the application of the coating product repairs shall be completed to ensure the following:

1. All inflow and infiltration shall be eliminated by use of appropriate repair material.

2. All repairs to joints, pipe seals, steps, mechanical penetrations, benches, inverts, pipes or other appurtenances to be coated shall be completed and repaired surfaces prepared according to this section.

a. Benches or other horizontal surfaces shall have adequate slope (1” rise per lineal foot minimum) to minimize the retention of debris following surcharge.

b. Inverts or flow channels shall be smooth without lips, rough edges or other features which may cause debris to collect; contoured to minimize turbulent flow; and be sloped to promote adequate flow from the inlet(s) to the outlet pipe.

c. All joints, pipe seals, steps or other penetrations shall be sealed against inflow, infiltration and exfiltration and be adequately filled, smoothed and contoured to promote monolithic coating application.

I. Areas where reinforcing steel has been exposed shall be repaired in accordance with the Project Engineer's recommendations prior to coating with the coating product specified or other approved zinc based primer as specified by the coating product manufacturer.

3.03 APPLICATION OF REPAIR AND RESURFACING PRODUCTS

A. Repair products shall be used to fill voids, bugholes, and other surface defects which may affect the performance or adhesion of the coating product.

B. Repair 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 ½" minimum thickness or as recommended within manufacturers published guidelines. Should structural rebuild be necessary, these products shall be installed to a thickness as specified by the Project Engineer.

C. Repair products shall be used to remediate all active inflow, infiltration, and/or external soil/fill voids.

D. All repair products shall be handled, mixed, installed, and cured in accordance with manufacturer guidelines.

E. All repaired or resurfaced substrates shall be inspected for cleanliness and suitability to receive the coating product.

3.04 APPLICATION OF COATING PRODUCTS

A. Application procedures shall conform to the recommendations of the coating products 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 products and shall be in proper working order.

C. Contractors qualified in accordance with these specifications shall perform all aspects of coating product(s) installation.

D. Prepared surfaces shall be coated via spray application of the coating product(s) described herein unless otherwise recommended by the coating product manufacturer.

E. Coating thickness shall be in relation to the profile of the surface to be coated as recommended by the coating product manufacturer. In all cases the coating product(s) shall be applied to a minimum dry film thickness of 80 mils to surface profiles of CSP-2 to CSP-5 or 125 mils minimum DFT to surface profiles of CSP-6 or greater.

F. Subsequent top coating or additional coats of the coating product(s) shall occur within the product's recoat window or 24 hours whichever is less. Additional surface preparation procedures will be required if this recoat window is exceeded.

G. Coating product(s) shall interface with adjoining construction materials/components throughout the structure to effectively seal and protect substrates from attack by corrosive elements and to ensure the effective elimination of infiltration into the sewer system.

H. Procedures and materials necessary to effect the interface between dissimilar materials and the coating product shall be as recommended by the coating product(s) manufacturer.

I. Termination points of the coating product(s) shall be made at the manhole frame and chimney joint (or other man way as is present), 1" below normal flow levels at the bench or within the invert [unless invert is specified to receive coating], and a minimum of 1" interfacing within each pipe penetration.

J. Sewage flow shall be stopped, bypassed, or diverted as necessary for application of the coating product(s) to the invert and interface with pipe materials.

3.05 TESTING AND INSPECTION

A. Coating system thickness shall be inspected to ensure compliance with the specifications herein.

1. 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.

2. After the coating product(s) have cured in accordance with manufacturer recommendations, coating system thickness may be measured according to SSPC-PA 9 - Measurement of Dry Coating Thickness on Cementitious Substrates Using Ultrasonic Gages.

B. High voltage holiday detection for coating systems installed in corrosive environments, when it can be safely and effectively employed, shall be performed to ensure monolithic protection of the substrate. After the coating product(s) have cured in accordance with manufacturer recommendations, all surfaces shall be inspected for holidays in accordance with NACE RPO 188-99 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates or ASTM D4787 Standard Practice for Continuity Verification of Liquid or Sheet Coatings Applied to Concrete Substrates. All detected holidays shall be marked and repaired according to the coating product(s) manufacturer's recommendations.

1. Test voltage shall be a minimum of 100 volts per mil of coating system thickness.

2. Detection of a known or induced holiday in the coating product shall be confirmed to ensure proper operation of the test unit.

3. All areas repaired shall be retested following cure of the repair material(s).

4. In instances where high voltage holiday detection is not feasible a close visual inspection shall be conducted and all possible holidays shall be marked and repaired as described above.

5. Documentation of areas tested, equipment employed, results, and repairs made shall be submitted to the Owner/Engineer by Contractor.

C. Adhesion of the coating system to the substrate shall be confirmed in a minimum of 10% of the manholes coated, or for large structures once every 1000 square feet of coated area. After the coating product(s) have cured in accordance with manufacturer recommendations, testing shall be conducted in accordance with ASTM D7234 Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers. Owner's representative shall select the manholes or areas to be tested.

1. For each test manhole a minimum of three 20 mm dollies shall be affixed to the coated surface; one at the cone area, one at the mid-section and one near the bottom of the structure.

2. For larger structures a minimum of three 20 mm dollies shall be affixed to the coated surface at random locations within each 1000 square foot area or as otherwise agreed upon.

3. The adhesive used to attach the dollies to the coating shall be rapid setting with tensile strengths in excess of at least twice the anticipated failure point (generally at least 1000 psi) and permitted to cure in accordance with manufacturer recommendations. The coating and dollies shall be adequately cleaned and prepared to receive the adhesive. Failure of the dolly adhesive shall be deemed a non-test and require retesting.

4. Prior to performing the pull test, the coating shall be scored to the substrate, or within 10 mils of the substrate surface, by mechanical means without disturbing the dolly or coating system bond within the test area.

5. Two of the three adhesion pulls in each test area shall exceed 200 psi and shall include substrate adhered to the back of the dolly or no visual signs of the coating product in the test hole. Pulls tests with results between 150 and 200 psi may be acceptable if more than 50 percent of the substrate in the test area is adhered to the dolly.

6. Should a structure, or area, fail to achieve two successful pulls as described above, additional testing shall be performed at the discretion of the Owner or Project Engineer. Any areas detected to have inadequate bond strength shall be evaluated by the Project Engineer. Further bond tests may be performed in that

area to determine the extent of potentially deficient bonded area and repairs shall be made by Contractor.

7. All adhesion testing shall be performed by qualified personnel using calibrated equipment as specified by the applicable ASTM standard(s).

8. All adhesion testing shall be documented and submitted in a consistent format detailing location, test values, description of the failure point/mode, scoring method employed, adhesive used, cure time of coating and adhesive and other data as deemed necessary by the owner/engineer.

9. All adhesion test locations shall be repaired by the Contractor at no cost to the Owner.

D. Visual inspection shall be made by the Project Engineer and/or Inspector. Any deficiencies in the finished coating affecting the performance of the coating system or the operational functionality of the structure shall be marked and repaired according to the recommendations of the coating product(s) manufacturer.

E. The municipal sewer system may be returned to full operational service as soon as the final inspection has taken place and all coating materials have been adequately cured according to the coating product(s) manufacturer's recommendations.

F. Provide final written report to Owner/Engineer detailing the location, date of report, description of repair and description of coating.

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SECTION 11208

SUBMERSIBLE WASTEWATER PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. Furnish all labor, materials, equipment and incidentals required and install, place in operation, and field submersible pumps for D10 and D11 lift station rehabilitation.

2. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, the delivery and complete installation and field testing, of all materials, equipment and appurtenances for the complete pumping units as herein specified, whether specifically mentioned in these Specifications or not.

3. For all units there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not, and as required for an installation incorporating the highest standard for this type of service including field testing of the entire installation and instructing the regular operating personnel in the care, operation and maintenance of all equipment.

4. In order to provide single source responsibility and compatibility between the various equipment items, control panels for pumps specified in this Section shall be furnished by the supplier of the pumping equipment.

1.02 QUALIFICATIONS

A. The pumps covered by these Specifications are intended to be standard pumping units of proven ability as manufactured by a manufacturer having a minimum of five (5) years experience in the production of such pumps. The pumps furnished shall be designed, constructed and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards.

B. All equipment furnished under this Specification shall be new and unused, shall be the standard product of manufacturers having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of five (5) years.

C. The pumps shall be furnished complete with accessories required and shall be as manufactured by Flygt or HOMA.

1.03 SUBMITTALS

A. Copies of all materials required to establish compliance with the Specifications shall be submitted in accordance with the provisions of the bidding documents. Submittals shall include at least the following:

1. Shop and erection drawings showing all important details of construction, dimensions and anchor bolt locations.

2. Descriptive literature, bulletins, and/or catalogs of the equipment.

3. Data on the characteristics and performance of each pump. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for head, capacity, efficiency, NPSH, submergence, horsepower, Preferred Operating Range (POR), and Allowable Operating Range (AOR). Curves shall be submitted on 8-1/2-inch by 11-inch sheets, at as large a scale as is practical. Curves shall be plotted from no flow at shut off head to pump capacity at minimum specified TDH. Catalog sheets showing a family of curves will not be acceptable.

4. The total weight of the equipment including the weight of the single largest item.

5. A complete total bill of materials of all equipment.

6. A list of the manufacturer's spare parts to be supplied in accordance with Paragraph 1.05.

7. All submittal data required by the General Conditions.

8. Complete motor data including:

Nameplate identification
No-load current
Full load current
Full load efficiency
Locked rotor current
High potential test data
Bearing inspection report

B. In the event that it is impossible to conform with certain details of the Specifications due to different manufacturing techniques, describe completely all nonconforming aspects.

C. Warranty: Submit warranties covering the items included under this Section.

1. Warranty time periods shall start from Start-up date and not ship dates.

2. Pump warranty shall not be affected by the inclusion of existing control panel, or provision of new control panel by owner.

3. Include pump temperature and moisture protection instruments and monitoring relays furnished by pump supplier in accordance with warranty.

1.04 OPERATING INSTRUCTIONS

A. Operating and maintenance manuals shall be furnished. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc., that are required to instruct operating and maintenance personnel unfamiliar with such equipment. The number and special requirements shall be as specified in the bidding documents.

B. A factory representative of all major component manufacturers, who has complete knowledge of proper operation and maintenance, shall be provided for one (1) 8-hour day to instruct representatives of the Owner and the Engineer on proper operation and maintenance. If there are difficulties in operation of the equipment due to the manufacturer's design or fabrication, additional service shall be provided at no cost to the Owner.

1.05 TOOLS AND SPARE PARTS

A. One (1) set of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.

B. Guaranteed Parts Stock Program: The pump supplier shall have a guaranteed parts stock program in the State of Florida.

C. Required spare parts include all parts that normally require maintenance in the five (5) years after installation. Spare parts shall be properly bound and labeled for easy identification without opening the packaging and suitably protected for long-term storage. Spare parts shall be delivered to the Owner prior to pump station start-up.

1.06 PRODUCT HANDLING

A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.

B. All equipment and parts must be properly protected against any damage during a prolonged period at the site.

C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.

D. Finished surfaces of all exposed pump openings shall be protected by wooden blanks, strongly built and securely bolted thereto.

E. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

F. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.

G. Each box or package shall be properly marked to show its net weight in addition to its contents.

1.07 WARRANTY

A. The pump manufacturer shall warrant the units being supplied against defects in workmanship and material for a period of five (5) years or 10,000 hours of operation, whichever occurs first. The warranty must not be prorated and must cover the pumps at 100% coverage for the entire five (5) year period against defects in workmanship and material.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The pumping units required under this Section shall be complete including pumps and motors with proper alignment and balancing of the individual units. All parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness and to be especially adapted for the work to be done.

B. Each discharge connection for each pump shall be rigidly and accurately anchored into position. All necessary anchor bolts, nuts, and washers shall be Type 316 stainless steel and shall be furnished by the pump manufacturer for installation by the Contractor.

C. Stainless steel nameplates giving the name of the manufacturer, the rated capacity, head, speed, and all other pertinent data shall be attached to each pump and motor.

2.02 PUMPS

A. The pumps shall be totally submersible non-clog centrifugal pumps with submersible closed coupled motors designed to pump sewage. The design shall be submersible design with steel guide rails. Pumps shall include a cast iron suction elbow and steel mounting stand with a pump discharge base and rail system. The pump shall be furnished with a vertical motor configuration.

B. The impeller shall be constructed of gray cast iron, ASTM A-48, Class 30 minimum. The design shall permit low liquid velocities and gradual acceleration and change of flow direction of the pumped media. The impeller/casing design shall result in a passage free of surfaces to which solid or fibrous materials can adhere. The overall pump design shall combine high efficiency, low required NPSH, large sphere passage and the ability to handle high solids concentrations efficiently. All other parts shall be of close grain gray iron construction, with all parts coming into contact with the pumped liquid protected by an approved sewage resistant coating. Metal surfaces that will be in contact with the pumped liquid, other than stainless steel or brass, shall be protected by a factory-applied spray coating of acrylic dispersion zinc phosphate primer. Exterior surfaces of the pump shall also receive a polyester resin finish coating. All external bolts, nuts and washers shall be of Type 316 stainless steel. The impeller shall be of a centrifugal non-clog type, capable of passing solids and fibrous material of the size specified in Table 11208-A.

C. Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals, each consisting of one (1) stationary and one (1) rotating tungsten-carbide ring with each pair held in contact by a separate spring. Lapped seal faces must be hydrodynamically lubricated at a constant rate. The lower seal unit, between the pump and oil chamber, shall contain one (1) stationary and one (1) positively driven rotating tungsten-carbide ring. Silicone-carbide may be used in place of tungsten-carbide for the lower seal. The upper seal unit, between the oil pump and motor housing, shall contain one stationary tungsten-carbide ring and one positively driven rotating tungsten-carbide ring. The compression spring shall be protected against exposure to the pumped liquid. The pumped liquid shall be sealed from the oil reservoir by one face seal and the oil reservoir from the motor chamber by the other. The seals shall require neither maintenance nor adjustment, and shall be easily replaced. Conventional double mechanical seals with a single spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to opening and penetration by pumping forces shall not be considered equal to tandem seals specified and required.

D. A wear ring system shall be used to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be equipped with a nitrile rubber coated steel ring insert that is drive fitted to the volute inlet. On pumps 20 horsepower and larger, a stainless steel impeller wear ring heat-shrink fitted onto the suction inlet of the impeller shall also be provided.

E. Pump motors shall be housed in an air-filled watertight casing and shall have minimum Class F insulation windings which shall be moisture resistant. Motors shall be NEMA Design B, rated 180 degrees C minimum and shall have a service factor of 1.15. Pump motors shall have cooling characteristics suitable to permit continuous operation, in totally, partially and non-submerged conditions. Each motor shall incorporate an ambient temperature compensated overheat sensing device. Also, moisture sensors shall be provided for all units that operate under partially or totally submerged conditions. The protective devices shall be wired into the pump controls in such a way that if the device detects an abnormal condition the pump will shut down. The protective devices shall be self-resetting. The cable shall be fixed to the pump using a watertight assembly. The pump shall be capable of running continuously in a totally dry condition under full load without damage, for extended periods. The pump shall be capable of sustaining a minimum of ten (10) evenly spaced starts per hour continuously without damaging the pump or motor in any way. Before final acceptance, a field running test demonstrating this ability, with 24 hours of continuous operation under the above conditions, shall be performed for all pumps being supplied, if required by the Owner. Pump motor cable shall be suitable for submersible pump applications and shall be properly sealed.

F. The pump cable entry water seal design shall preclude specific torque requirements to ensure a watertight and submersible seal. The cable entry shall be comprised of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable. The assembly shall bear against a shoulder in the pump top. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the motor interior from foreign material gaining access through the pump top. Control conductors shall be included in the cable. The pump supplier shall provide a watertight connector, equal to Crouse Hinds Type CGB or Hubbel Type SLB, with a neoprene gland to terminate the cable in the control panel. Secondary sealing systems using epoxy potting compounds are also acceptable.

G. Bearings: the pump shaft shall rotate on at least three grease-lubricated bearings. The upper bearing, provided for radial forces, shall be a single roller bearing. The lower bearings shall consist of at least one roller bearing for radial forces and one or two angular contact ball bearings for axial thrust. The minimum bearing life shall be 100,000 hours at any point along the usable portion of the pump curve at maximum product speed. The lower bearing housing shall include an independent thermal sensor to monitor the bearing temperature. If a high temperature occurs, the sensor shall activate an alarm and shut the pump down.

H. The junction chamber, containing the terminal board, shall be sealed from the motor by an elastomer compression seal (0-ring). Connection between the cable conductors and

stator leads shall be made with threaded compressed type binding posts permanently affixed to a terminal board and thus perfectly leak proof.

I. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum turbine run-away speed of the unit due to back flow through the pump.

J. Performance Requirements: The pumps furnished shall meet the "Performance Requirements" set forth at the end of this Section in Table 11208-A. The brake horsepower required by each pump shall not exceed the nameplate horsepower of the pump drive motor over the entire pump-operating curve.

2.03 SHOP PAINTING

A. Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter.

B. All pumps and motors shall be shop coated, with manufacturer's standard coating.

C. All nameplates shall be properly protected during painting.

D. Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to the Engineer up to the time of the final acceptance test.

2.04 CONTROL PANELS

A. Control panels for the pumps shall be furnished in accordance with Division 16.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations and in the locations shown on the Drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Anchor bolts shall be set in accordance with the manufacturer's recommendations.

B. The Contractor shall submit a certificate from the equipment manufacturer stating that the installation of the equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

3.02 INSPECTION AND TESTING

A. General:

1. The Engineer shall have the right to inspect, test or witness tests of all materials or equipment to be furnished under these Specifications, prior to their shipment from the point of manufacture.

2. The Engineer shall be notified in writing prior to initial shipment, in ample time so that arrangements can be made for inspection by the Engineer.

3. The Engineer or his representative shall be furnished all facilities, including labor, and shall be allowed proper time for inspection and testing of material and equipment.

4. Materials and equipment shall be tested or inspected as required by the Engineer, and the cost of such work shall be included in the cost of the equipment. The Contractor shall anticipate that delays may result because of the necessity of inspection, testing and accepting materials and equipment before their use is approved.

5. The services of a factory representative shall be furnished for one (1) day and he shall have complete knowledge of proper operation and maintenance to inspect the final installation and supervise the test run of the equipment. With the permission of the Owner these services may be combined with those provided under Paragraph 1.05 of this Section.

6. Field tests shall not be conducted until such time as the entire installation is complete and ready for testing.

B. Pumps:

1. After all pumps have been completely installed, and working under the direction of the manufacturer, conduct in the presence of the Engineer, such tests as are necessary to indicate that pumps conform to the Specifications. Field tests shall include all pumps included under this Section. Supply all electric power, water or wastewater, labor, equipment and incidentals required to complete the field tests.

2. If the pump performance does not meet the Specifications, corrective measures shall be taken or pumps shall be removed and replaced with pumps which satisfy the conditions specified. A 24-hour operating period of the pumps will be required before acceptance. During this 24-hour operating period, the Contractor shall supply all power necessary.

3.03 FIELD TESTING

A. Upon completion of all the mechanical work, the Contractor shall conduct testing as specified herein to demonstrate that the equipment performs in accordance with all specifications.

B. The Contractor shall perform initial testing of the equipment ensuring to himself that the tests listed in the Final Acceptance Test paragraph below can be satisfactorily completed.

C. The Contractor shall give written notice, seven (7) days in advance, of the date of Final Acceptance Test to the Owner and Engineer. All tests shall be in conformance with other applicable Sections of these Specifications.

D. The Final Acceptance Test shall demonstrate that all items of these Specifications have been met by the equipment as installed and shall include, but not be limited to, the following tests:

1. That all units have been properly installed and are in correct alignment.

2. That the units operate without overheating or overloading any parts and without objectional vibration.

3. That there are no mechanical defects in any of the parts.

4. That the pumps meet the specified hydraulic requirements.

5. That the pumps shall be capable of pumping raw, unscreened sewage.

6. That the pump sensors and controls perform satisfactorily as to sequence control, correct start and stop elevations, and proper alarm functions.

E. In the event that the equipment does not meet the Final Acceptance Test, the Contractor shall, at his own expense, make such changes and adjustments in the equipment which he deems necessary and shall conduct further tests until full satisfaction is indicated by the Engineer and written certification is received thereof.

F. The Owner will pay the salaries of the personnel selected by the Owner for operation of the equipment. Payment of all other salaries, public utility services, and operating expenses shall be borne by the Contractor for the test period and any additional test period required.

3.04 TRAINING

A. After completion of the field certification and testing, a minimum of three (3) separated four (4) hour operator instruction and training sessions on equipment and system operation shall be provided. Contractor shall provide a proposed list of dates and times to hold the training sessions to the City at least (3) three weeks prior to the proposed dates, City must approve times prior to final scheduling the training. The training shall provide a complete overview of all equipment, testing, adjusting, operation, and maintenance procedures. The training shall take the form of classroom sessions at the project site conducted by the manufacturer or local representatives who are knowledgeable and familiar with the project. Hands-on instruction and training will be conducted so that actual operation and maintenance of the equipment and systems can be performed by Owner upon completion of the training. Training shall be provided to

the owner prior to final system start up. The training shall take the form of classroom and field instruction and shall cover:

1. Documentation in the final Operation and Maintenance Manuals.

2. Use the Operation and Maintenance Manuals or other guides.

3. Equipment and system startup and shutdown.

4. System operation procedures for all modes of operation.

5. Procedures for dealing with abnormal conditions and emergency situations for which there is a specified system response.

6. Any and all special tools, equipment training manuals used during the training shall be the property of the OWNER upon completion of the training.

3.05 PUMP PERFORMANCE SCHEDULE

A. Pumps shall be furnished according to "Table 11208-A, Pump Performance Schedule" below:

TABLE 11208-A

PUMP PERFORMANCE SCHEDULE

Parameter	Pumps	
	D-10	D-11
Number of Pumps	2	2
Pump Type	Submersible	Submersible
Type of Drive	VFD	VFD
Design Capacity per Pump, GPM/Ft. TDH	288/24.6	288/30.3
Pump Model (Flygt/Homa)	NP 3102 MT 3~ Adaptive 465 / AVX444-180/7,5T/C	NP 3102 MT 3~ Adaptive 465 / CAMX434-184/4D/C
Minimum Efficiency at Design Capacity, Percent (Flygt/Homa)	55.5% / 39.4%	53.7% / 64.8%
Minimum Size Solids, In.	3”	3"
Minimum Suction Size, In. (Flygt/Homa)	4” / 4”	4" / 4”
Minimum Discharge Size, In. (Flygt/Homa)	4” / 4”	4" / 4”
Maximum Horsepower Per Pump, HP (Flygt/Homa)	5 / 7.5	5 / 4
Maximum Overall Height, In. * (Flygt/Homa)	23.75” / 31.5”	23.75” / 20.875”

* Maximum overall height measured from top of lifting ring to bottom of suction volute flange.

END OF SECTION

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SECTION 11312

COLLECTION SYSTEM BYPASS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work covered by this Section consists of providing all bypassing to perform all operations in connection with the flow of wastewater around pipe segment(s), wastewater systems, wastewater force mains, or lift stations. The purpose of bypassing is to prevent wastewater overflows and provide continuous service to all wastewater customers. The Contractor shall maintain wastewater flow in the construction area in order to prevent backup and/or overflow and provide reliable wastewater service to the users of the wastewater system at all times. Temporary bypass is required at multiple locations through the project duration. In addition, noise attenuation for bypass pumping operations will be required.

PART 2- PRODUCTS

2.01 GENERAL

A. The Contractor shall provide and maintain adequate equipment, piping, tankers and other necessary appurtenances in order to maintain continuous and reliable wastewater service in all wastewater lines as required for construction. Bypass pumping operation to be conducted by manned supervision 24 hours per day (including weekends) and backup emergency auto-dialer installed. The Contractor shall have tankers, backup pumps, backup generators, piping and appurtenances ready to deploy immediately.

B. Bypass pumps shall be skid mounted diesel pumps/systems as manufactured by Thompson Pumps, Godwin Pumps, Rain for Rent, or an approved equal.

C. Blocked gravity lines shall include two (2) line stops, one (1) primary and one (1) redundant.

D. Bypass equipment shall include discharge flow meter and multiple pressure gauges.

E. Bypass plan/systems shall have complete redundancy and shall include one (1) back-up pump equal to the primary.

F. Bypass pumping operations shall allow for continuous pedestrian and vehicular access at all times including all necessary materials and equipment such as temporary piping, pipe bypass flow ramps (H20 loaded), signage, maintenance of traffic, and all other items needed for bypass operations to maintain continual access.

PART 3- EXECUTION

3.01 GENERAL

A. The Contractor shall have scheduled delivery of all materials, equipment and labor necessary to complete the repair, replacement or rehabilitation to the job site prior to isolating the gravity main segment, manhole, or pump station. The Contractor shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of 48 hours prior to beginning the work.

3.02 TRAFFIC CONSIDERATIONS

A. The Contractor shall locate bypass pumping suction and discharge lines so as to not cause undue interference with the use of streets, private driveways, and alleys. This requirement may necessitate temporary trenching of piping at critical intersections. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or others methods shall be deployed by the Contractor to facilitate traffic over surface piping. High traffic commercial properties may require alternate methods.

3.03 BYPASS PLAN

A. The Contractor shall submit a comprehensive written plan according to Specification 01340, which describes the intended bypass for the maintenance of flows during construction. The Contractor shall also provide a sketch showing the location of bypass pumping equipment and materials for each pump station or line segments around which flows are being bypassed. The plan shall include any proposed tankers, pumps, supports, bypass piping, bypass piping ramps (H20 loaded), backup plan and equipment, work schedule, monitoring log for bypass pumping, monitoring plan of the bypass pumping operation, signage, noise attenuation, maintenance of traffic plan and all other items for an approved bypass plan. The Contractor shall cease bypass operations and return flows to the new and/or existing sewer when directed by the Owner. All piping shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi, whichever is greater. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto, any area outside of the existing wastewater system. When bypass operations are complete, all bypass piping shall be drained into the wastewater system prior to disassembly. Conceptual bypass plans for each lift station improvement area are listed below:

Bypass Plan Concept for D10:

1) Establish MOT

2) Construct bypass piping and pump out

3) Temporarily bypass out of GS piping upstream and downstream into pump out connection

4) Remove existing GS manhole

5) Construct GS piping/rigid fernco at tie-in to new GS piping to north

6) Construct new manholes and GS piping

7) Remove LS influent piping

8) Long term bypass pumping for wet well rehabilitation

Bypass Plan Concept for D11:

1) Establish MOT

2) Construct bypass piping and pump out

3) Temporarily bypass out of GS piping upstream and downstream into pump out connection

4) Construct new mh during and GS piping during non-peak hours

5) Remove LS influent piping

6) Long term bypass pumping wet well rehabilitation

3.04 BYPASS OPERATION

A. The Owner shall review and provide written comments to the bypass plan prior to implementation of the bypass. The Contractor shall plug off and pump down the line segment in the immediate work area and shall maintain the wastewater system so that surcharging does not occur.

B. The Owner shall accept the bypass plan prior to implementation of the bypass. Contractor will plug off and pump down the line segment in the immediate work area. A successful 3-day test period shall be performed during Owner work days (no weekends). If the Contractor is unable to isolate the system prior to installation of the temporary bypass connection, then a wet tap will be required at the expense of the Contractor.

C. Where work requires the line to be blocked beyond NORMAL WORKING HOURS and bypass pumping is being utilized, the Contractor shall be responsible for on-site monitoring the bypass operation 24 hours per day, 7 days per week, by on-site personnel. Additionally, backup emergency auto-dialer installation is required.

D. During bypassing, no wastewater will be leaked, dumped, or spilled in or onto, any area outside of the existing wastewater system.

E. The Contractor shall insure that no damage will be caused to private property as a result of bypass pumping operations. The Contractor shall complete the work as quickly as possible and satisfactorily pass all tests, inspections and repair all deficiencies prior to discontinuing bypassing operations and returning flow to the sewer manhole, line segment, or lift station.

F. The Contractor shall immediately notify the Owner should a sanitary sewer overflow occur and the Contractor shall take the necessary action to clean up and disinfect the spillage to the satisfaction of the Owner and/or other governmental agency. If sewage is spilled onto public or private property, the Contractor shall wash down, clean up and disinfect the spillage to the satisfaction of the Owner and/or other governmental agency. When bypassing, complete redundancy is required. One back-up pump equal to the primary unit shall be required. Bypass pumps and motors shall have a maximum rating of 55 decibels at 20 feet for sound attenuation.

G. Contractor shall provide secure temporary fencing around all bypass pumping equipment. Owner shall be given keys to access the bypass equipment.

3.05 CONTRACTOR LIABILITY

A. The Contractor shall be responsible for all required pumping, equipment, piping and fittings, signage, bypass piping ramps, appurtenances and all other items to accomplish the bypass and for any and all damage that results directly or indirectly from the bypass pumping equipment, piping and/or appurtenances not functioning properly. The Contractor shall also be liable for all Owner personnel and equipment costs, penalties and fines resulting from sanitary sewer overflows. In addition to the aforementioned costs to be paid by the Contractor, a fine of $5,000 per overflow occurrence or sanitary sewer disruption shall be assessed. For each 24-hour period following overflow that the wastewater overflow/damage is not completely cleaned, disinfected, and returned to full operational capacity an additional $5,000 fine will be assessed daily. It is the intent of these specifications to require the Contractor to establish adequate bypass pumping as required regardless of the flow condition.

END OF SECTION

SECTION 13410

BASIC INSTRUMENTATION REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General administrative and procedural requirements for instrumentation installations.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Product data for each product specified.

2. Wiring diagrams, both elementary and schematic, differentiating between manufacturer installed and field-installed wiring.

3. Digital Systems: Provide the following:

a. Digital equipment layouts of input and output racks showing complete module model number and addressing assignment. Layouts of port pin assignment, connection schematic indicating cable types and port addresses.

B. Record Drawings: At Project closeout, submit record drawings of installed products.

1. Where Drawings are drafted by computer equipment, CONTRACTOR shall furnish files on a disk. These Drawings shall include changes made by Field Orders, Change Orders, Addenda, and errors discovered during start-up and acceptance.

2. Drawings shall include terminal numbers at each wiring termination and piping termination. A complete system diagram shall be included.

C. Operation and Maintenance Manuals: Submit operation and maintenance manuals for items included under this Section.

1. Instructions shall be short, easy-to-understand directions specifically written for this Project describing various possible methods of operating equipment. Instructions shall include procedures for tests required, adjustments to be made, and safety precautions to be taken with equipment. These documents are to be submitted to ENGINEER's office.
2. Provide 1 complete set of manufacturer's documentation covering programmable equipment supplied. Include hardware manuals and prints as manufacturer normally ships with programmable equipment.

a. Include complete software manuals for operating system, as well as manuals for any other software. Written instructions for the operations and maintenance of software shall be provided. The instructions shall be short, easy-to-understand directions specifically written for this Project describing various possible methods of operating software.

b. Include program listings, point/address lists, cross-reference listings, images of screens, data entry forms, and sample reports.

c. Manuals shall include instructions for program users and instructions for maintenance programmers.

D. Warranty: Submit warranties covering the items included under this Section.

1. Warranty time periods shall start from Start-up date and not ship dates.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of equipment, of types and sizes required, and whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. National Electric Code.

2. Applicable State and local requirements.

3. UL listing and labeling shall be adhered to.

C. Items covered by this Section are designated as undelivered specifically manufactured equipment for which associated progress payments will be made in accordance with this Specification.

D. Equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that equipment furnished has been manufactured in accordance with National Electric Code and OSHA requirements.

E. CONTRACTOR shall provide permits and licenses, observe and abide by applicable laws, regulations, ordinances, and rules of State, territory or political subdivision thereof, wherein the Work is done. CONTRACTOR shall pay fees for permits, inspections, licenses, and certifications when such fees are required with the exception of City permits being paid for by the City.

F. To ensure timely performance and conformance with Specifications, Project meetings shall be held at OWNER's facility once every 3 months during course of Project. Cost of such meetings shall be included.

G. Component Requirements: For the purposes of uniformity and conformance to industry standards, signal transmission modes shall be electronic 4-20 mA DC. No other signal characteristics are acceptable, 4-20 mA DC signals shall be such that devices may be wired in parallel for 1-5 volt DC as required. 1-5 volt DC mode shall be employed only within control panel enclosures.

H. Responsibility and Coordination: Drawings and Specifications are intended to include details of a complete equipment installation for purposes specified. CONTRACTOR shall be responsible for details which may be necessary to properly install, adjust, and place in operation complete installation. Any error on Drawings or in Specifications which prevents proper operation of supplied system shall be shown correct at time of Shop Drawing submittal for approval or brought to attention of ENGINEER with or prior to submittal.

I. CONTRACTOR shall be responsible for costs incurred to correct aforementioned errors brought to ENGINEER's attention. CONTRACTOR shall assume full responsibility for additional costs which may result from unauthorized deviations from Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Manufactured material shall be adequately packed to prevent damage during shipping, handling, storage, and erection. Material shipped to Site shall be packed in a container properly marked for identification. Blocks and padding shall be used to prevent movement.

B. CONTRACTOR shall inspect the material prior to removing it from carrier. If damage is observed, CONTRACTOR shall immediately notify carrier so that a claim can be made. If no such notice is given, material shall be assumed to be in undamaged condition; any subsequent damage that occurs to the equipment shall be the responsibility of CONTRACTOR. Repair and replacement of damaged parts will be done at no expense to OWNER.

C. CONTRACTOR shall be responsible for any damage charges resulting from handling of materials.

PART 2 - PRODUCTS

2.01 EQUIPMENT SUPPLIERS

A. References made in these Specifications to specific manufacturer’s products are intended to serve as a guide to type, construction, and materials. Listing of a manufacturer does not imply acceptance by ENGINEER of a manufacturer's particular product, product line, or latest product revision if it does not meet Specifications.

B. Equipment Supplier: Equipment specified under Sections 13413 through 13899 and shown on Drawings shall be designed as a system, fabricated or purchased, shipped to Site, and started up by one of the qualified and approved equipment suppliers listed under this Section. Intent is for unit responsibility.

1. Equipment supplier shall not assign any of its rights or delegate any of its obligations under these Sections without prior written acceptance by ENGINEER.

2. Direct purchase of any items in these Sections by CONTRACTOR is not in compliance with this Specification and will not be permitted.

3. When a Service Contract is included, it shall be performed by factory-trained personnel employed by equipment supplier. Equipment supplier shall assign a qualified Engineer employed by the supplier as Project Engineer/Project Manager.

    a. Project Engineer/Project Manager's name shall be forwarded to CONTRACTOR and ENGINEER within 30 days after receipt of a purchase order by equipment supplier.

    b. Project Engineer/Project Manager shall be focal point for design, fabrication, Contract communications, and shall be responsible for start-up and acceptance. Project Engineer/Project Manager shall be at factory test at Site for start-up and at the Site during entire acceptance procedure. Only qualified and approved equipment suppliers shall be accepted as meeting this Specification.

2.02 EQUIPMENT

A. Transmitted electronic signals to equipment of other vendors and between control panels shall be a separate isolated-floating output for each item of equipment and shall conform to ISA Standard S50.1.

B. Enclosures shall be 316 SS NEMA 4X as indicated on Drawings. Intrinsically safe systems, as approved by Factory Mutual, shall be furnished when called for.

C. No external power connections shall be allowed unless specifically called for in Specification. Where an external power source is called for, unit shall accept 120 VAC, plus or minus 10 percent power.

D. Size and style of instruments are defined in Specifications.

E. Charts and scales are shown on Drawings. Standard scales shall not be accepted without ENGINEER's approval if it differs from those shown. Ratio station scales and other scales shall be graduated such that major graduations fall on whole numbers (i.e., 1, 2, 3, or 5, 10, 15, etc.) and minor graduations fall on 0.1 or 0.2 intervals (i.e., 1.1, 1.2 or 11, 12, etc.). If two scales are called for on ratio stations, each scale shall be indexed to meet Specification. Drawing of each scale for ratio stations shall be submitted with Shop Drawings for approval.

F. Solid-state output switches, where used, shall be overvoltage transient protected and not be damaged by dI/dT or dv/dt for their design application under this Contract.

G. Instruments shall be equipped with permanently attached identification tag. Tag shall be included on field- and panel-mounted devices. Tags shall include ENGINEER's tag identification and manufacturer's tag identification if different from ENGINEER's.

    1. Tags shall be either stamped metal or laminated phenolic with white letters engraved on a black background. Field-mounted devices shall have tags fastened with screws. Devices

mounted in panels will be tagged inside panel on subplates or on device itself where it can be easily read.

H. Finish on instruments and accessories shall provide protection against corrosion by elements in environment in which they are to be installed. Both the interior and exterior of enclosures shall be finished. Extra paint of each color used on material shall be provided by manufacturer for touch-up purposes.

I. Provide equipment identification nameplates complying with Section 16075. Nameplates shall contain ENGINEER's item designation and, for indicators and transmitters, design range and units of device shown.

2.03 SOURCE QUALITY CONTROL

A. Control and monitoring system control panels and computer equipment, if any, shall be tested at the factory and witnessed by ENGINEER prior to shipment to Site. ENGINEER shall be given 4 weeks notice before factory test date. Factory test shall include checking for conformity to Specifications, fabrication, and nomenclature. Control and monitoring system logic and terminals shall be checked line by line and function by function in total for conformity of Drawings.

B. Conduct preliminary testing prior to factory checkout by executing programs supplied for this Project. Exercise inputs to test logic for correct function and proper response of outputs. Verify correct interface with programs. Verify correct communications.

C. Factory testing shall be used to validate fieldbus and plant LAN/WAN interconnections. Proper communication between devices and software components shall be demonstrated. Data Collection and Data Management Reporting shall be demonstrated.

D. Equipment supplier shall have test equipment available at the factory. A full set of annotated logic programs and wiring diagrams with the latest revisions shall be made available to ENGINEER at factory for checking purposes. Drawings shall include wire numbers and terminal numbers.

E. Control panels and programmable equipment shall not be shipped to Site until logic conforms to Contract requirements, physical changes required by testing are made, and tags conform to factory test corrections. Equipment delivered to Site without factory test or corrections will be returned to factory at CONTRACTOR's expense.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment provided under this Section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions, and recommendations of equipment manufacturer as approved by ENGINEER.

B. Install equipment as indicated, in accordance with manufacturer's written instruction, and in compliance with recognized industry practices to ensure that products fulfill requirements.

C. Drawings are not intended to show every detail of construction or location of piping, ductwork, or equipment. Where proper operation or construction makes it necessary or advisable to change location of piping, instrumentation equipment, air ducts, or other equipment, CONTRACTOR shall so inform ENGINEER for his approval and permission.

3.02 FIELD QUALITY CONTROL

A. Calibrate equipment in accordance with manufacturer's instructions to ranges or set points indicated on Drawings.

B. Installation and Start-up: Equipment supplier shall have an established service facility from which qualified technical service personnel and parts may be dispatched upon call. Such a service facility shall be no more than 6 hours travel time from Site.

1. Equipment supplier shall provide an experienced, factory-trained, competent, and authorized service representative for a minimum of 3 times at Site, including once during installation and start-up and once during acceptance to inspect, check, and calibrate any part of system. Supplier's service representative shall revisit Site for 8 hours per day as often as necessary after installation until trouble is corrected and equipment has passed acceptance test and is operating satisfactorily to OWNER and ENGINEER.

2. Third trip is after equipment has been accepted and shall be used to instruct OWNER's personnel in aspects of operation and maintenance, such as fuse locations, use of controls, instruction manuals, etc. Third trip shall be for duration of one, 8-hour day at OWNER's facility.

3.03 DEMONSTRATION

A. Upon completion of installation and calibration, demonstrate functioning of equipment in accordance with requirements. Where possible, correct malfunctioning units at Site, then retest to demonstrate compliance; otherwise, remove and replace with new or repaired units, and retest to demonstrate compliance.

END OF SECTION

SECTION 15000

MECHANICAL-GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. All equipment furnished and installed under this contract shall conform to the general stipulations set forth in this Section except as otherwise specified in other Sections.

2. Contractor shall coordinate all details of equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alternations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.

B. Related Work Described Elsewhere: Other Sections directly referenced in this section include the following:

1. General Requirements: Division 1.

2. Concrete: Division 3.

3. Finishes: Division 9.

4. Equipment: Division 11.

5. Electrical: Division 16.

C. Contract Drawings and Specifications: The Contract Drawings and Specifications shall be considered as complementary, one to the other, so that materials and work indicated, called for, or implied by the one and not by the other shall be supplied and installed as though specifically called for by both. The Contract Drawings are to be considered diagrammatic, not necessarily showing in detail or to scale all of the equipment or minor items. In the event of discrepancies between the Contract Drawings and Specifications, or between either of these and any regulations or ordinances governing work of these Specifications, the bidder shall notify the Engineer in ample time to permit revisions.

1.02 QUALITY ASSURANCE

A. Materials and Equipment: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in the Work. No such material or equipment shall be used by the Contractor for any purpose other than that intended or specified, unless such use is specifically authorized in writing by the Owner. No material shall be delivered to the site without prior acceptance of drawings and data by the Engineer.

B. Equivalent Materials and Equipment:

1. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing the type, function, and quality desired. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Engineer to determine that the products proposed are equivalent to those named. Such items shall be submitted for review in accordance with Section 01420: Drawings and Submittals.

2. Requests for review of equivalency will not be accepted from anyone except the Contractor and such requests will not be considered until after the contract has been awarded.

C. Governing Standards: Equipment and appurtenances shall be designed in conformity with ANSI, ASME, ASTM, IEEE, NEMA, OSHA, AGMA, and other generally accepted applicable standards. They shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operations. All bearings and moving parts shall be adequately protected against wear by bushings or other acceptable means. Provisions shall be made for adequate lubrication with readily accessible means.

D. Tolerances: Machinery parts shall conform to the dimensions indicated on the Drawings within allowable tolerances. Protruding members such as joints, corners, and gear covers shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.

E. Clearances: Ample clearances shall be provided for inspection and adjustment. All equipment shall fit the allotted space and shall leave reasonable access room for servicing and repairs. Greater space and room required by substituted equipment shall be provided by the Contractor and at his expense.

F. Testing:

1. When the equipment is specified to be factory tested, the results of the tests shall be submitted to the Engineer and approval of the test results shall be obtained before shipment of the equipment.

2. When an item of equipment, including controls and instrumentation, has been completely erected, the Contractor shall notify the Engineer, who will designate a time to make such tests as required, and operate the item to the satisfaction of the Engineer. All testing shall be done in the presence of the Engineer. "Completely erected" shall mean that the installation is erected, all necessary adjustments have been made, all required utility connections have been made, required lubricants and hydraulic fluid have been added and the unit has been cleaned and painted.

G. Pressure Test:

1. After installation, all piping shall be pressure tested. Piping shall be tested in accordance with Section 15995: Pressure Testing of Piping.

2. All tests shall be made in the presence of and to the satisfaction of the Engineer and also, to the satisfaction of any local or State inspector having jurisdiction.

   a. Provide not less than three (3) days notice to the Engineer and the authority having jurisdiction when it is proposed to make the tests.

   b. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of the Engineer shall be retested in part or in whole as directed by the Engineer.

   c. The piping systems may be tested in sections as the Work progresses but no joint or portion of the system shall be left untested.

3. All elements within the system that may be damaged by the testing operation shall be removed or otherwise protected during the operation.

4. All defects and leaks observed during the tests shall be corrected and made tight in an approved manner and the tests repeated until the system is proven tight.

5. Repair all damage done to existing or adjacent work or materials due to or on account of the tests.

6. Provide test pumps, gauges, or other instruments and equipment required for the performance of all tests. Provide all temporary bracing, test plugs, additional restraint, and thrust blocking which may be required for test pressures above normal working pressures.

7. All tests shall be maintained for as long a time as required to detect all defects and leaks but not less than the duration specified for each type of pipe or piping system in this Division.

H. Failure of Test:

1. Defects: Any defects in the equipment, or deviations from the guarantees or requirements of the Specifications, shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to correct any defects or deviations, or if the replaced equipment when tested shall fail again to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials, may reject that equipment and order the Contractor to remove it from the premises at the Contractor's expense.

2. Rejection of Equipment: In case the Owner rejects a particular item of equipment, then the Contractor hereby agrees to repay to the Owner all sums of money paid to him to deliver to the Contractor a bill of sale of all his rights, title, and interest in and to the rejected equipment provided, however that the equipment shall not be removed from the premises until the Owner obtains from other sources other equipment to take the place of that rejected. The bill of sale shall not abrogate the Owner's right to recover damages for delays, losses or other conditions arising out of the basic Contract. The Owner hereby agrees to obtain the alternate equipment within a reasonable time and the Contractor agrees that the Owner may use the original equipment furnished by him without rental or other charge until the other equipment is obtained.

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

J. Acceptance of Materials:

1. Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and acceptance of the Owner. No material shall be delivered to the work without prior submittal approval of the Engineer.

2. The Contractor shall submit to the Engineer data relating to materials and equipment he proposes to furnish for the work. Such data shall have in sufficient detail to enable the Engineer to identify particular product and to form an opinion as to its conformity to the Specifications.

3. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to

beginning or during the progress of the work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the Specifications. Such sample shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for tests.

4. The Contractor shall submit data and samples sufficiently early to permit consideration and acceptance before materials are necessary for incorporation in the work.

K. Safety Requirements:

1. In addition to the components shown and specified, all machinery and equipment shall be safeguarded in accordance with the safety features required by the current codes and regulations of ANSI, OSHA, and local industrial codes.

2. The Contractor shall provide for each V-belt drive or rotating shaft a protective guard which shall be securely bolted to the floor or apparatus. The guard shall completely enclose drives and pulleys and be constructed to comply with all safety requirements.

1.03 SUBMITTALS (SEE SECTION 01420: DRAWINGS AND SUBMITTALS)

1.04 MAINTENANCE MATERIALS

A. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

PART 2 - PRODUCTS

2.01 FABRICATION AND MANUFACTURE

A. Workmanship and Materials:

1. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage or other failure. Materials shall be suitable for service conditions.

2. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gages so that repair parts, furnished at

any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

3. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch thick.

B. Lubrication:

1. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

2. Lubricants of the type recommended by the equipment manufacturer shall be furnished by the Contractor in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation for the entire warranty period prior to acceptance of equipment by Owner. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.

3. Lubrication facilities shall be convenient and accessible. Lubrication fittings shall be the zerk type for each piece of equipment. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

C. Safety Guards: All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gage or heavier galvanized or aluminum-clad sheet steel or 1/2 inch mesh galvanized expanded metal. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

D. Equipment Foundation Supports:

1. All foundations, platforms and hangers required for the proper installation of equipment shall be furnished and installed by the Contractor.

2. Unless otherwise indicated or specified, all equipment shall be installed on reinforced concrete bases at least 6 inches high and shall conform to requirements set forth in Division 3 for cast-in-place concrete. Cast iron or welded steel baseplates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single

baseplate of neat design. Baseplates shall have pads for anchoring all components and adequate grout holes. Baseplates for pumps shall have a means for collecting leakage and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with 1 inch minimum grout. All open equipment bases shall be filled with nonshrinking grout sloped to drain to the perimeter of the base.

3. The Contractor shall furnish, install and protect all necessary guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of equipment. These shall be of ample size and strength for the purpose intended.

4. All anchor bolts, anchor bolt templates, and location drawings required for the installation of the equipment, support columns, and for all other equipment or machinery included under this Contract shall be furnished by the Contractor. All mechanical equipment shall be anchored using hook anchor bolts, cast-in-place, unless specifically called for otherwise on the Drawings. Anchor bolts, sleeves, and inserts shall be set in place in forms and cast in the concrete by the Contractor. It shall be the responsibility of the Contractor to obtain such anchor bolts, templates, and approved location drawings in proper time to avoid delay, and it shall be his further responsibility to check and approve the location and setting of the anchor bolts, sleeves, and inserts prior to the casting of the concrete. Parts of anchors or metal work that are not built into masonry and concrete shall be coated with approved paint. Anchor bolts for column base plates and other structural elements shall be of Type 316 stainless steel unless indicated otherwise; anchor bolts for drives, motors, fans, blowers, and other mechanical equipment shall be of Type 316 stainless steel. Anchor bolts shall be of ample size and shall be provided with hexagonal nuts of the same quality of metal as the bolts. All threads shall be clean cut and of U.S. Standard sizes.

5. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and sizes. Expansion bolts, if called for on the Drawings, shall be furnished and installed by the Contractor. No other use of expansion bolts will be allowed without prior approval of the Engineer.

6. Unless specified otherwise, stud, tap, and machine bolts shall be of Type 316 stainless steel. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI B1.1-latest for "Unified and American Screw Threads for Screws, Bolts, Nuts, and Other Threaded Parts."

7. All bolts, anchor bolts, nuts, and washers shall be Type 316 stainless steel.

8. Anchor bolts and expansion bolts shall be set accurately. Anchor bolts which are set before the concrete has been placed shall be carefully held in suitable templates of approved design provided under this Contract. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square

plates at least 4" x 4" x 3/8" or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both.

9. Structural steel supports and miscellaneous steel required for supporting and/or hanging equipment and piping furnished under this Division shall be provided and installed by Contractor.

10. All foundations, anchor pads, piers, thrust blocks, inertia blocks and structural steel supports shall be built to template and reinforced as required for loads imposed on them.

11. The Contractor shall assume all responsibility for sizes, locations and design of all foundations, anchor pads, pier, thrust blocks, inertia blocks, curbs and structural steel supports.

E. Shop Painting:

1. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. Exposed surfaces shall be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with a high-grade oil-resistant enamel suitable for coating in the field with an alkyd enamel. Coatings shall be suitable for the environment where the equipment is installed.

2. Surfaces to be painted after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of the specified primer. Unless otherwise specified, the shop primer for steel and iron surfaces shall be Koppers "No. 10 Inhibitive Primer", or equal.

3. Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound, Houghton "Rust Veto 344", Rust-Oleum "R-9", or equal.

F. Nameplates: Contractor shall provide equipment identification nameplates for each item of equipment. Nameplates shall be 1/8 inch Type 304 stainless steel and shall be permanently fastened.
Plates shall be fastened using round head metallic drive screws, or where metallic drive screws are impractical, with stainless steel pop rivets. Metallic drive screws shall be brass or stainless steel, Type V and No. 8 by 3/8 inch long. Names and/or equipment designations shall be engraved on the plates and the engraving painted with a primer and black paint system compatible with stainless steel. Contractor shall submit a list of proposed names and designations for review prior to fabrication of nameplates. At a minimum, each nameplate shall include equipment manufacturer's name, year of manufacture, serial number and principal rating data.

G. Pipe Identification:

1. All pipe (except underground) shall have code letters and flow arrows painted as per Division 9. The Contractor shall ensure that the pipes are properly marked.

2. Underground pipe and tube: Pipe and tube shall be located by laying 2 inch wide plastic tape continuously along the run of pipe or tube per Division 9.

H. Noise Attenuation and Control:

1. Unless otherwise specified, the maximum permissible noise level for a complete installed piece of equipment located within or outside a structure shall not exceed 85 dB at 3 feet. A complete piece of equipment includes the driver and driven equipment, plus any intermediate couplings, gears, and auxiliaries. All equipment provided herein that is specified to be factory and field tested shall be tested as specified herein for noise generation at the equipment manufacturer's expense.

2. Maximum permissible noise (sound pressure) levels shall be in decibels as read on the "A" weighting scale of a standard sound level meter (dB); all measurements shall be made in relation to a reference pressure of 0.0002 microbar. Measurements of emitted noise levels shall be made on a sound level meter meeting at least the Type 2 requirements set forth in ANSI S1.4, Specification for Sound Level Meters. The sound level meter shall be set on the "A" scale and to slow response. Unless otherwise specified for a particular piece of equipment, the point of measurement of sound level shall be made at the specified distance from any major surface along the entire perimeter and at midheight of the piece of equipment, or at the specified distance from an outer major surface encompassing the sound source including inlets or outlets.

I. Fire Hazard Rating:

1. All piping, duct work, and equipment insulation, fastener, and jacketing materials shall have a fire hazard rating not to exceed 25 for flame spread, 50 for fuel contributed, and 50 for smoke developed. Rating shall be determined by ASTM Designation E84, "Surface Burning Characteristics of Building Materials". Corresponding ratings determined by Underwriters' Laboratories, Inc., UL-723, "Test Method for Fire Hazard Classification of Building Materials", will also be acceptable.

2. Flameproofing treatments will not be acceptable.

2.02 ACCESSORIES

A. Special Tools and Accessories: Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for

proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

B. Fasteners: All nuts, bolts, anchors and other fastening devices shall be a minimum of Type 316 stainless steel.

PART 3 - EXECUTION

3.01 INSTALLATION AND OPERATION

A. Installation: Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary for proper results. When so specified, or when employees of Contractor or his subcontractors are not qualified, such personnel shall be field representatives of the manufacturer of the equipment or materials being installed.

1. The Contractor shall have on site sufficient proper construction equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character. To minimize field erection problems, mechanical units shall be factory assembled when practical.

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

3. All equipment shall be installed in such a manner as to provide access for routine maintenance including lubrication.

4. For equipment such as pumping units, which require field alignment and connections, the Contractor shall provide the services of the equipment manufacturer's qualified mechanic, millwright, machinist, or authorized representative, to align the pump and motor prior to making piping connections or anchoring the pump base.

5. Equipment of a portable nature which requires no installation shall be delivered to a location designated by the Owner.

B. Tolerances: Precision gauges and levels shall be used in setting all equipment. All piping and equipment shall be perfectly aligned, horizontally and vertically. Tolerances for piping and equipment installation shall be 1/2 inch to 30 ft. horizontal and vertically. All valves and operators shall be installed in the position shown on the Drawings or as directed by the Engineer, if not shown.

C. Alignment and Level: The equipment shall be brought to proper level by shims (1/4 inch maximum). After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to bind the machine firmly into place against the wedges or shims. Grouting shall be as specified in Division 3.

D. Grouting: The grout shall be tamped into position with a board, steel bar, or other tool. Tamping should not be so hard as to raise or otherwise displace the plate.

E. Contact of Dissimilar Metals: Where the contact of dissimilar metal may cause electrolysis and where aluminum will contact concrete, mortar, or plaster, the contact surface of the metals shall be separated using not less than one coat of zinc chromate primer and one heavy coat of aluminum pigmented asphalt paint on each surface.

F. Cutting and Patching: All cutting and patching necessary for the work shall be performed by the Contractor.

G. Operation: All equipment installed under this Contract, including that furnished by Owner or others under separate contract, shall be placed into successful operation according to the written instructions of the manufacturer or the instructions of the manufacturer's field representative. All required adjustments, tests, operation checks, and other startup activity shall be provided.

3.02 OBSERVATION OF PERFORMANCE TESTS

A. Where the specifications require observation of performance tests by the Engineer, such tests shall comply with the quality assurance paragraph in this section.

END OF SECTION

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SECTION 15050

UTILITY PIPING, FITTINGS, VALVES, AND ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Work included in this Section consists of furnishing all labor, equipment, and materials and in performing all operations necessary for the construction, installation or restoration of all utility piping, valves, and appurtenances complete and ready for operation as shown on the Drawings and specified herein.

2. All products in contact with potable water shall be in accordance with ANSI/NSF Standard 61 for potable water contact.

3. City will furnish materials and equipment as indicated in the Drawings and specified herein. The Contractor shall coordinate project requirements and City furnished materials and equipment and provide all materials not specifically identified as City furnished required for a complete system. Piping, fittings, valves, and accessories not provided by the City shall be as specified herein.

B. Related Work Described Elsewhere:

1. Shop Drawings: Section 01340.

2. Warranties and Bonds: Section 01740.

3. Excavation, Backfilling and Compaction: Division 2.

4. Painting: Division 9.

5. Equipment: Division 11.

6. Pressure Testing of Piping: Section 15995.

1.02 QUALITY ASSURANCE

A. Construction Requirements:

1. All the lines shall be installed with at least 36-inches of cover.

2. For underground utilities, changes in horizontal alignment of less than 11-1/4 degrees may be achieved through the use of allowable pipe deflection in lieu of fittings shown on the Drawings at the Contractor's option, but subject to approval of the Engineer as to layout. Said deflection shall not exceed 75 percent of the maximum allowable deflection as stated in the pipe manufacturer's installation instructions.

3. Install proposed pipe so as not to scratch, dent, or damage any existing pipes. Pipe shall be installed in a way that prevents damaging existing pipe. If existing pipes are damaged due to construction, the Contractor shall be required to repair the pipe according to the City's requirements.

B. Pipe Inspection: The Contractor shall obtain from the pipe manufacturers a certificate of inspection to the effect that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these Specifications. All pipe and fittings shall be subject to visual inspection at time of delivery by rail or truck and also just before they are lowered into the trench to be laid. Joints or fittings that do not conform to these Specifications will be rejected and must be removed immediately by the Contractor.

The entire product of any plant may be rejected when, in the opinion of the Engineer, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.

1.03 SUBMITTALS

A. Shop Drawings:

1. In general, the following Shop Drawings shall be submitted to the ENGINEER for approval prior to construction:

a) Mill test certificates or certified test reports on pipe and fittings.

b) Details of restrained and flexible joints.

c) Valve boxes.

d) All valves, plug and check.

e) Couplings.

f) Wet taps.

g) Service saddles.

h) Pressure gauges.

i) Flexible expansion joints, tie rods, and flanged coupling adapters.

j) Joint lubricant.

k) Temporary plug and anchorage system for hydrostatic pressure test.

l) Detailed piping layout drawings and pipe laying schedule (see below).

2. Tabulated layout schedule for each pipe system including:

a) Pipe invert station and elevation at each change of grade and alignment.

b) The limits of each reach of pipe thickness class and of restrained joints.

c) The limits of each reach of concrete encasement.

d) Locations of valves and other mechanical equipment.

e) Methods and locations of supports.

f) Details of special elbows and fittings.

g) Identify the limits of City furnished materials and equipment.

3. A separate Shop Drawing submittal will be required for each major item listed above and for each different type of an item within a major item. For example, separate submittals will be required for each valve type. All submittals shall be in accordance with the General and Special Conditions and Section 01340: Shop Drawings.

B. Acceptance of Material:

1. The Contractor shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings, and specials furnished under this Contract comply with all applicable provisions of current AWWA and ASTM standards and these Specifications. No pipe or fittings will be accepted for use in the Work on this project until the Affidavit has been submitted and approved by the Engineer.

2. The City reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

C. Operation and Maintenance Manuals: Submit operation and maintenance manuals for applicable components requiring periodic maintenance and/or explanation of operation. Manuals shall be prepared in accordance with Section 01730: Operating and Maintenance Data. Information shall include:

1. Detailed assembly drawings, clear and concise instructions for operating, adjusting, overhauling, troubleshooting and, other maintenance. Include shop drawings previously submitted and approved with all corrections made.

2. A complete lubrication schedule including lubricant types, grades, and recommended frequency of lubrication.

3. A list of parts for all products with catalog numbers and all data necessary for ordering replacement parts. Such instructions and parts lists shall be prepared for the specific product furnished and shall not refer to other types or models.

1.04 DELIVERY, STORAGE AND HANDLING

A. Pipe, fittings, valves, and accessories shall be handled in such manner as to ensure a sound undamaged condition during shipping, delivering, and installing.

B. Particular care shall be taken not to injure the pipe coating and linings.

C. Insides of valves and piping shall be kept free of dirt and debris.

1.05 JOB CONDITIONS

A. Water in Excavation: Water shall not be allowed in the trenches while underground pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working. In no case shall the pipelines being installed be used as drains for such water, and the ends of the pipe shall be kept properly and adequately plugged during construction by the use of approved stoppers and not by improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the work any such materials has entered the pipelines, it must be cleaned as directed by the Engineer so that the entire system will be left clean and unobstructed.

1.06 PIPE MATERIAL SCHEDULE

A. Drawings present a pipe material schedule that designates the types of pipe that are to be used in various applications.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Ductile Iron Pipe: Ductile iron pipe shall conform to the requirements of ANSI, A21.51 and AWWA C151, latest revision. The minimum pressure class for underground pipes shall be Class 150. Pipe shall be furnished in laying lengths of 20 feet or less, unless specifically shown otherwise on the Drawings. Flanged pipe shall have a minimum thickness class of Class 53. All pipe and fittings shall be new and unused, no refurbished piping or fittings will be accepted.

B. Coating and Lining

1. Corrosion Resistant Interior Lining: All ductile iron pipe, fittings, and specials for force mains shall be lined with Protecto 401 Ceramic Epoxy Pipe Coating with a minimum dry film thickness of 40 mils applied by the pipe manufacturer. Storage, surface preparation, application, and safety precautions shall strictly follow manufacturer's instructions.

2. Standard Lining: All ductile iron pipe, fittings, and specials for water and reuse mains shall have an interior protective lining of cement-mortar with a seal coat of asphaltic material in accordance with ANSI/AWWA A21.4/C104. For process air service, the standard lining shall be omitted and the pipe shall be unlined.

3. Exterior Coatings for Buried Pipe: Ductile iron pipe, fittings, and specials to be installed underground shall be coated on the exterior at the factory with an asphaltic coating approximately 1 mil thick as specified in AWWA C151.

4. Exterior Coating for Exposed Pipe: Ductile iron pipe, fittings, and specials to be installed aboveground shall be furnished with a shop applied primer on the exterior as specified in Drawings.

C. Fittings: Fittings for ductile iron pipe shall be either mechanical joint, restrained joint, or flanged joint as indicated on the Drawings and shall have a minimum working pressure of 250 psi. Fittings shall be ductile iron and shall conform to ANSI/AWWA C110/A21.10, ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53, latest revisions for flanged and mechanical joint pipe. Fittings shall be coated and lined in the manner specified above for ductile iron pipe. The rubber gaskets for flanged, mechanical, and push-on joints shall be as described below.

D. Push-On Joints: Pipe using push-on joints shall be in strict accordance with ANSI/AWWA C111/A21.11, latest revision and shall be as manufactured by an Approved Manufacturer as presented the Appendix, “Approved Manufacturer’s List”. Jointing materials shall be provided by the pipe manufacturer and installation shall be in strict accordance with the manufacturer's recommended practice. For process air service, joint materials shall be rated for an operating temperature of at least 300º F.

E. Mechanical Joints: Jointing materials for mechanical joints shall be provided by the pipe and fitting manufacturer. For process air service, joint materials shall be rated for an operating temperature of at least 300º F. Materials assembly and bolting shall be in strict accordance with ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53, latest revisions. Tee head bolts and nuts for mechanical joints shall be manufactured of high strength, low alloy steel in accordance with ANSI/AWWA C111/A21.11.

F. Flanged Joints: Flanges shall be Class 125 per ANSI B16.1 with any special drilling and tapping as required to insure correct alignment and bolting.

1. Gaskets:

a. Liquid Service: Fullface, 1/8-inch thick, cloth-inserted rubber: Johns-Manville No. 109, John Crane Co., Style 777, or equal. Gaskets shall be suitable for a water pressure of 350 psi at a temperature of 180°F.

b. Air Service: 1/8-inch thick resilient material rated for an operating temperature of at least 300º F.

2. Bolts, nuts, and washers for flanges shall be of carbon steel conforming to ASTM A307, Grade B. The bolts and all items associated with the bolt assemblies shall be hot dip galvanized.

3. Flanges shall be long-hub type screwed tightly on pipe by machine at the foundry prior to facing and drilling. Flange machine surfaces shall be coated with rust inhibitor immediately after facing and drilling. Field assembled screwed on flanges are prohibited.

G. Restrained Joints and Fittings: Pipe joints and fittings shall be restrained in accordance with the Drawings and the requirements of this Specification. In cases where the calculated required length of restrained pipe is not evenly divisible by nominal laying lengths of pipe, the total required length of restrained pipe shall be rounded up to the next closest nominal length that is evenly divisible by the standard laying length.

1. Manufactured Restrained Joints: Manufactured restrained joints shall be 1100 Series manufactured by an Approved Manufacturer as presented in the Appendix, “Approved Manufacturer’s List”.

2. Restrained joint pipe and fittings shall be ductile iron only and shall comply with applicable portions of this Specification. Manufactured restrained joints shall be capable of deflection during assembly. Deflection shall not exceed 80 percent of the manufacturer's recommendations.

3. Tee head bolts and nuts for restrained joints shall be manufactured of high strength, low alloy steel in accordance with ANSI/AWWA C111/A21.11.

H. Alternate Restrained Joints: Ductile iron pipe and fittings with mechanical joints may be restrained using a follower gland which includes a restraining mechanism. When actuated during installation, the restraining device shall impart multiple wedging action against the pipe wall which increases resistance as internal pressure in the pipeline increases.

1. The joint shall maintain flexibility after installation. Glands shall be manufactured of ductile iron conforming to ASTM A536 and restraining devices shall be of heat treated ductile iron with a minimum hardness of 370 BHN. The gland shall have standard dimensions and bolting patterns for mechanical joints conforming to ANSI/AWWA C111 and C153, latest revisions.

2. Tee head bolts and nuts shall be manufactured of corrosion-resistant, high strength, low alloy steel in accordance with ANSI/AWWA C111/A21.11.

3. The restraining wedges shall have twist-off nuts to insure proper torquing. The mechanical joint restraint device shall have a minimum working pressure rating of 250 psi with a minimum safety factor of 2 to 1 and shall be MEGALUG^{Ò} as manufactured by EBBA Iron, Inc.

I. All fittings, joints, restraints, and pipe shall be manufactured by City-approved manufacturer included in the Appendix.

2.02 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Small PVC Pressure Piping: Unless otherwise specified, PVC pressure pipe smaller than 4 inches nominal diameter shall be Schedule 80 PVC in accordance with ASTM D1785. Schedule 80 pipe shall have either solvent welded or threaded joints. PVC pressure pipe shall bear the approved seal of the National Sanitation Foundation (NSF). PVC pressure pipe shall be FDOT approved for all installations within County and FDOT right-of-ways. PVC pipe that is exposed to sunlight shall be manufactured with additives to provide resistance to ultraviolet deterioration.

1. Fittings: Socket type, solvent welded fittings for Schedule 80 PVC pipe shall be in conformance with ASTM D2467. Threaded type fittings for Schedule 80 PVC pipe shall be in conformance with ASTM D2464. All solvent welded or threaded joints shall be watertight.

2. Flanges: Flanges for Schedule 80 PVC pipe shall be rated for a 150 psi working pressure with ANSI B 16.1 dimensions and bolting pattern. Flanges shall be connected to PVC piping with either solvent welded or threaded joints in accordance with ASTM D2467 or ASTM 2464, respectively. Gaskets shall be neoprene, full faced type with a minimum thickness of 1/8-inch. Nuts and bolts shall be hexagonal with machine threads, manufactured of Type 316 stainless steel in accordance with ASTM A320, Class 2. Type 316 stainless steel flat washers w/lock washers shall be used against PVC flanges. The nuts shall have a hardness

that is lower than that of the bolts and washers by a difference of 50 Brinnell hardness to prevent galling during installation.

3. Solvent Cement: PVC solvent cement shall be in compliance with ASTM D2564 and in accordance with the pipe manufacturer's recommendations.

4. Thread Lubricant: Lubricant for Schedule 80 threaded joints shall be Teflon tape only.

B. Large PVC Pressure Piping: Unless otherwise noted, PVC pressure pipe for nominal diameters 4 inches and larger in size shall conform to the requirements of AWWA C900 DR18 up to 12 inches and AWWA C905 DR18 larger than 12 inches with gasketed integral bell ends. Pipe shall be designed for maximum working pressure of not less than 150 psi and with not less than a 4 to 1 sustained hydrostatic pressure safety factor. PVC pressure pipe shall be FDOT Approved for all installations within County and FDOT right-of-ways. Fittings shall be ductile iron fittings with restrained mechanical joint ends as specified hereinbefore. Pipe shall be made to ductile iron pipe O.D.'s instead of IPS.

C. Bell and Spigot:

1. Pipe joints shall be made with integral bell and spigot pipe ends. The bell shall consist of an integral thickened wall section designed to be at least as strong as the pipe wall. The bell shall be supplied with factory glued rubber ring gasket which conforms to the manufacturer's standard dimensions and tolerances. The gasket shall meet the requirements of ASTM F477 "Elastomeric Seals (Gaskets) for Joining Plastic Pipe". PVC joints manufacturer shall be selected from one of the specified “Manufacturers” in the “List of Materials and Approved Manufacturers” as presented in the Appendix of these technical specifications.

D. Restrained Joints:

1. In accordance with the Drawings, to prevent pipe joints and fittings from separating under pressure, pipe joints and fittings shall be restrained as follows:

a) PVC pipe bell and spigot joints shall be restrained with one of the specified “Manufacturers” in the City of Fort Lauderdale “Approved Manufacturer's Listing” presented as an Appendix of these technical specifications. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A536, Grade 6542-10. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy CORTEN steel meeting the requirements of ASTM A242.

b) Mechanical joint fittings used with PVC pipe shall be restrained with the EBBA Iron MEGALUG® Series 2000 PV Restrainer or an equal approved by the Engineer. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A536, Grade 65-42-10. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy CORTEN steel meeting the requirements of ASTM A242.

E. Fittings

1. All fittings for use with PVC pipe three (3) inches and larger in size shall be gray cast iron or ductile iron with a minimum working pressure of 250 psi and shall conform to ANSI/AWWA A21.10/C110, latest revision. Fittings shall have mechanical joint bell ends manufactured in accordance with ANSI/AWWA A21.11/C111, and Florida Administrative Code (FAC) Chapter 62-555.322, latest revision. Jointing materials for mechanical joints shall be provided by the fitting manufacturer. Materials, assembly and bolting shall be in accordance with ANSI/AWWA A21.11/C111, latest revision. Tee head nuts and bolts for mechanical joints shall be manufactured of corrosion resistant high strength, low alloy COR-TEN steel meeting the requirements of ASTM A 242.

2. All cast iron and ductile iron fittings for use with PVC pipe shall be coated and lined as specified below:

a. Exterior of Fitting:

1) Ground buried pipe and fittings shall have factory applied bituminous coating or coal tar varnish or asphalt base paint, 1.0 mil thick.

2) Exposed pipe and fittings shall have factory applied coating of a universal rust-inhibitive primer 2.0 mils dry thickness.

b. Interior of Fitting:

1) Epoxy Lining: Two component, self priming, chemically cured, hi-build coal tar epoxy protective coating with a minimum DFT of 30 mils. To be used in wastewater applications only.

2) Cement-Mortar lining: In accordance with ANSI 21.4 for cement mortar linings. To be used where indicated on pipe schedule for water applications.

F. All fittings, joints, restraints, and pipe shall be manufactured by City-approved manufacturer included in the Appendix.

2.03 PIPE COUPLINGS

A. Couplings: Pipe couplings used to join two pieces of plain end pipe shall be sized to suit the outside diameter of the pipe ends to be jointed. Transition couplings shall be used to join pipes of different outside diameters. Pipe couplings shall be bolted type with steel middle ring and end followers.

B. Coating: All carbon steel parts of the coupling shall be coated on the interior and exterior with a fusion bonded thermosetting epoxy coating with a 12-mil nominal coating thickness. The coating manufacturer shall be selected from one of the specified "Manufacturers" in the "List of Materials and Approved Manufacturers" as presented as an Appendix to these technical specifications.

C. Gaskets: Gaskets for the coupling shall be wedge type manufactured of Buna-N resilient rubber.

D. Bolts: Bolts shall be manufactured of high strength Type 316 stainless steel with Type 316 stainless steel hexagonal nuts. Bolts and nuts shall conform dimensionally to ANSI/AWWA C111, latest revision.

E. Manufacturer: Couplings shall be Style 38 and manufacturer shall be selected from one of the specified "Manufacturers" in the City of Fort Lauderdale "Approved Manufacturer's Listing" presented in the Appendix of these technical specifications.

2.04 FLANGED ADAPTER COUPLINGS

A. Adapters shall be suitable for joining plain-end pipe to flanged pipes and fittings. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges, 125 or 150 pound standard, unless otherwise required for connections (ANSI B16.1 125 lb./ANSI B16.5 150 lb.).

B. Adapters shall be constructed of Type 316 stainless steel. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8 for bolts, and ASTM A194, Grade 8 for nuts and washers. Bolts and nuts greater than 1 1/8 inches in diameter shall be carbon steel ASTM A307, Grade B, with cadmium plating, ASTM A165, Type NS. Gasket material shall be suitable for exposure to the liquids to be contained within the pipes. All adapters shall be restrained with set screws to prevent axial movement. The restraint system shall be rated for a working pressure of at least 150 psi.

C. Adapters shall be Dresser Style 128 or equal.

2.05 FLEXIBLE EXPANSION JOINTS

A. Flexible expansion joints shall be of the molded wide double arch design manufactured of neoprene rubber with polyester and steel reinforcement. Neoprene body shall be supplied with a Hypalon coating. All expansion joints shall have filled arches. Joints shall be flanged, suitable for 150 psi water working pressure, and in accordance with ANSI

B16.1 dimensions and bolting patterns. Flanged ends shall be furnished with split 316 stainless steel retaining rings.

B. Provide 316 stainless steel limit restraint rods on all lines as follows:

Tie Bolts or Stud Requirements for Flexible Pipe Couplings

Nominal Pipe Size (Inches)	150 psi		300 psi	
	No. Bolts Or Studs	Size (Inches)	No Bolts Or Studs	Size (Inches)
2	2	5/8	2	5/8
3	2	5/8	2	5/8
4	2	5/8	2	5/8
6	2	5/8	2	5/8
8	2	5/8	2	5/8
10	2	5/8	2	3/4
12	2	3/4	2	7/8
14	2	3/4	2	1
16	2	7/8	2	1-1/4
18	2	1	2	1-3/8
20	2	1	2	1-1/2
24	4	1	4	1-1/4

C. Minimum performance for flexible expansion joints shall be as follows:

Size (In.)	Axial Compression (Inches)	Axial Elongation (Inches)	Lateral Deflection (Inches)	Angular Deflection Degrees
2	7/8	1/2	1	30
4	7/8	1/2	1	30
6	7/8	1/2	1	25
8	1-3/8	3/4	1	25
10	1-3/8	3/4	1	20
12	1-3/8	3/4	1	20
24	1-5/8	7/8	1	20

D. Flexible expansion joints shall be as manufactured by Mercer, Red Valve, General Rubber Corporation, Metraflex Company, or an equal approved by the Engineer.

2.06 PLUG VALVES

A. Plug valves shall be non-lubricated 100% full port eccentric type with flanged or mechanical joint ends as specified below. Valves shall open by turning to the left (counter-clockwise), when viewed from the stem. Port area of valves shall be a minimum of 100 percent of full pipe area. Valve pressure ratings, body flanges, and wall thicknesses shall be in full conformance with ANSI B16.1, latest revision. Valves shall seal leak-tight against full rated pressure in both directions. Prior to shipment from the factory, each valve shall be hydrostatically tested as follows. Valve seats shall be tested to provide leak

tight shut off to 175 psi for valves through 12-inch and 150 psi for valves 14 inches and larger, with pressure in either direction. In addition, a hydrostatic shell test shall be performed with the plug open to a pressure twice that of rating specified above to demonstrate overall pressure integrity of the valve body. Plug valves shall be eccentric plug valves as manufactured by City-approved manufacturer listed the Appendix.

B. Valve bodies shall be constructed of high strength cast iron conforming to ASTM A126, Class B and AWWA C504, latest revisions. Valve seats shall be formed by cast bodies with raised eccentric seats which have a corrosion-resistant welded-in overlay of not less than 90 percent pure nickel on all surfaces contacting the plug face. Valve seats shall be in accordance with AWWA C504 and AWWA C507, latest revisions. Valves shall be furnished with resilient faced plugs with neoprene facing, suitable for use with sludge. Valves shall be furnished with replaceable, permanently lubricated, stainless steel or fiberglass backed woven teflon fiber, sleeve-type bearings in the upper and lower plug stem journals. Plug stem bearings shall comply with AWWA C504 and C507, latest revisions. Valves shall be bolted bonnet design. Valves shaft seals shall be designed so that they can be repackaged without removing the bonnet and the packing shall be adjustable. Packing material shall be Buna-Vee type packing. Valve shaft seals shall be in accordance with AWWA C504 and AWWA C507, latest revisions. All exposed valve nuts, bolts, springs, washers, and the like shall be Type 316 stainless steel.

C. All interior ferrous surfaces of the valve, except the valve seating surfaces, shall be coated with a factory applied, fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free with a minimum thickness of 12 mils. Surfaces shall be clean, dry, and free from rust, oil, and grease before coating.

D. All exterior surfaces of plug valves shall be clean, dry, and free from rust and grease before coating. For buried service, the exterior ferrous parts of all valves shall be coated at the factory. For valves installed aboveground, the exterior ferrous parts of all valves shall be shop primed at the factory with one coat, minimum dry film thickness 2 - 3.5 mils, of a lead and chromate-free primer with rust-inhibitive pigments and synthetic resins. Primer shall be suitable for finish paint specified. Following installation, above-ground valves shall be finish painted in accordance with the Drawings.

E. All plug valves installed above ground, in valve vaults, or on flanged piping shall have flanged ends as specified for ductile iron pipe, unless otherwise shown on Drawings. Flanges shall comply with facing, drilling, and thickness of ANSI Standards for Class 125 dimension. All buried plug valves shall have mechanical joint ends as specified for ductile iron pipe.

F. Mechanical Valve Actuators

1. Each plug valve installed underground shall have a gear actuator with a 2-inch square nut designed for buried and submerged service. Gear actuator shall be sized for the maximum pressure differential across the valve, equal to the pressure rating of the valve. Valve shall have seals on all shafts and gaskets on valve and actuator covers to prevent entry of water and dirt. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed valve nuts, bolts, springs, washers, and the like shall be Type 316 stainless steel.

2. Each aboveground plug valve and all plug valves installed in concrete vaults shall be furnished with a mechanical gear actuator furnished with a handwheel. Gear actuator shall be sized for the maximum pressure differential across the valve, equal to the pressure rating of the valve. All gearing shall be enclosed in a high-strength cast iron housing, suitable for running in a lubricant. Housing shall be provided with seals on all shafts to prevent the entry of dirt and water into the actuator. Actuator shaft and quadrant shall be supported on permanently lubricated bronze bearings. Actuator shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque.

2.07 SWING CHECK VALVES

A. Swing check valves 2-inch through 24-inch in size shall conform to AWWA C508, latest revision, and shall be designed for a minimum water working pressure of 150 psi. Check valves shall have cast iron body, swing type design, and ends shall be flanged, Class 125 in accordance with ANSI B16.1. When open, the valve shall have a straight way passage with a minimum flow area equal to the full pipe area. Swing check valves shall be completely bronze fitted with renewable bronze seat ring and a rubber faced disc. Valve hinge pin shall be stainless steel. Check valves shall be supplied with an outside lever and weight. The check valve bonnet shall be provided with a tapped boss with plug for future installation of a pressure gauge.

B. Each check valve for the pumps shall be oil cushioned such that it opens smoothly on pump start-up and closes at a controlled rate of speed for the final predetermined portion of its stroke following pump shut-down. A single cushioning device mounted on the external side of the valve shall control the valve closure by way of the interchange of oil to and from an oil reservoir. The use of an air or gas pressurized oil reservoir shall not be permitted. On start-up of the pump, the check valve disc shall open in response to the flow and then afford the minimum resistance to the flow. Upon pump shut-down, the valve's counterweight shall initiate the valve closure at an unrestricted rate until the valve disc reaches the preselected point of closure. The point at which the adjustable closing speed occurs shall be field-adjustable. The closing speed shall also be adjustable in the field by way of a micrometer type needle valve. Each check valve shall include a limit/proximity switch to remotely monitor position of check valve.

C. Swing check valves shall absolutely prevent the return of water back through the valve when the inlet pressure decreases below the downstream pressure. The check valve shall be constructed such that the disc and body seat ring may be easily removed and replaced without removing the valve from the line. Each valve shall be hydrostatically tested at the factory, at a test pressure of 300 psi.

D. Prior to shipment from the factory, the interior ferrous surfaces of the valve, except for finished, non-ferrous, or bearing surfaces, shall be coated with a fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free, NSF approved, with a minimum thickness of 16 mils. Surfaces shall be clean, dry, and free from rust and grease before coating.

E. All exterior surfaces of swing check valves shall be clean, dry, and free from rust and grease before coating. Exterior ferrous parts of all valves shall be shop primed at the factory with one coat, minimum dry film thickness of 4 mils, of a rust inhibitive, universal primer. Primer shall suitable for finish paint specified. Following installation, valves shall be finish painted in accordance with the Drawings.

F. Valve Manufacturer: Swing check valves shall be manufactured by City-approved manufacturer listed in the Appendix.

2.08 VALVE BOXES

A. Assemble and place a valve box over the operating nut for each buried valve.

B. Valve extensions shall be provided for all buried valves when operating nut is deeper than 3 feet below final grade.

2.09 PIPE AND VALVE IDENTIFICATION SYSTEMS

A. Materials selected for identification systems for each type surface shall be the product of a single manufacturer.

B. Buried piping shall be identified by identification tape installed over the centerline of the pipelines.

1. Identification Tape for Steel or Iron Pipe: Identification tape shall be manufactured of inert polyethylene film so as to be highly resistant to alkalies, acids, or other destructive agents found in soil, and shall have a minimum thickness of 4 mils. Tape width shall be 6 inches and shall have background color specified below, imprinted with black letters. Imprint shall be as specified below and shall repeat itself a minimum of once every 2 feet for entire length of tape. Tape shall be Terra Tape Standard 250, or approved equal.

2. Identification Tape for Plastic or Non-Magnetic Pipe: Identification tape shall be manufactured of reinforced polyethylene film with a minimum overall thickness of 4 mils and shall have a 0.35 mil thick magnetic metallic foil core.

The tape shall be highly resistant to alkalies, acids, and other destructive agents found in soil. Tape width shall be 3 inches and shall have background color specified below, imprinted with black letters. Imprint shall be as specified below and shall repeat itself a minimum of once every 2 feet for entire length of tape. Tape shall be TerraTape Sentry Line 1350, or approved equal.

3. Warning tape shall be placed 12" to 18" above all pipe.

4. Tape background colors and imprints shall be as follows:

Imprint	Background Color
"Caution Sanitary Force Main Buried Below"	Green

5. Identification tape shall be "Terra Tape" as manufactured by Reef Industries, Inc., Houston, TX; Allen Systems, Inc., Wheaton, IL; or approved equal.

C. Buried piping shall be identified by a continuous longitudinal painted "green" stripe of oil-based enamel paint located within the top 90 degrees of the pipe. Said stripe shall be a minimum 2-inch in width for pipe sizes less than 24-inch in diameter and three stripes (3) 2-inch in width within the top 90 degrees for pipe sizes 24-inch and larger. All PVC shall be a single homogenous color as indicated by the identification color above.

D. Buried piping shall be installed with a continuous, insulated 14-guage solid copper wire installed along the top of the pipe for location purposes.

E. General Notes and Guidelines:

1. Pipelines, equipment, or other items which are not listed here shall be assigned a color by the City and shall be treated as an integral part of the Contract.

2. All inline equipment and appurtenances not assigned another color shall be painted the same base color as the piping. The pipe system shall be painted with the pipe color up to, but not including, the flanges attached to pumps and mechanical equipment assigned another color.

F. All insulated surfaces, unless otherwise specified, shall be given one (1) coat of sizing, one (1) prime coat, and one (1) finish coat.

2.10 MISCELLANEOUS ITEMS

A. Other items necessary for the complete installation and not specified herein shall conform to the details and notes shown on the Drawings. All minor items implied, usually included, or required for the construction of a complete operating system shall be installed whether shown on the Drawings or not.

PART 3 - EXECUTION

3.01 INSPECTION

A. All pipe, fittings, valves, and other material shall be subject to inspection and approval by the Engineer after delivery, and no broken, cracked, imperfectly coated, or otherwise damaged or unsatisfactory material shall be used. When a defect or crack is discovered, the injured portion shall not be installed. Cracked pipe shall have the defect cut off at least 12 inches from the break in the sound section of the barrel.

3.02 GENERAL INSTALLATION REQUIREMENTS

A. Excavation, backfill, and compaction shall conform to the provisions of Section 02220. Upon satisfactory installation of the pipe bedding material as specified in Section 02220, a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.

B. Cover for underground piping shall not be less than that indicated on the Drawings. The minimum cover for pipe shall be 36 inches. In areas where other piping conflicts preclude the maximum cover desired, the piping shall be laid to provide the maximum cover obtainable.

C. Pipe, fittings, valves, and accessories shall be installed as shown or indicated on the Drawings.

D. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation and cooperation with authorities of the City. Some such connections may have to be made during off-peak hours (late night or early morning).

E. Pipe Joint Deflection: Whenever it is desirable to deflect pipe joints to avoid obstructions or to maintain required alignment, the amount of the joint deflection shall not exceed 80 percent of the maximum limits allowed by the pipe manufacturer.

F. In preparation for pipe installation, placement (stringing) of pipe should be as close to the trench as practical on the opposite side of the trench from the excavated material. The bell ends of the pipe should point in the direction of the work progress.

G. Pipe and fittings shall be laid accurately to the lines and grades indicated on Drawings or required. Where grades for the pipeline are not indicated on the Drawings, maintain a uniform depth of cover with respect to finish grade. Care shall be taken to insure a good alignment both horizontally and vertically and to give the pipe a firm bearing along its entire length. Any pipe which has its grade or joint disturbed after laying shall be taken up and relayed.

H. All pipe and fittings shall be cleared of sand, dirt, and debris before laying. All precautions shall be taken to prevent sand, dirt, or other foreign material from entering the pipe

during installation. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end of the pipe before lowering into the trench and left there until the connection is made to the adjacent pipe. Any sand, dirt, or other foreign material that enters the pipe shall be removed from the pipe immediately. Interior of all pipe and fittings shall be kept clean after installation until accepted in the complete Work.

I. Any time that pipe installation is not in progress, the open ends of pipe shall be closed by a watertight plug or other method approved by the Engineer. Plugs shall remain in pipe ends until all water is removed from the trench. No pipe shall be installed when trench conditions are unsuitable for such work, including standing water, excess mud, or rain.

J. After pipe has been laid, inspected, and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place while conducting the preliminary hydrostatic test. No backfill shall be placed over the joints until the preliminary test is satisfactorily completed, leaving them exposed to view for the detection of visible leaks.

K. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.

L. Above-ground and Exposed Piping: Piping shall be cut accurately to measurements established at the job site and shall be worked into place without springing or forcing, properly clearing all equipment access areas and openings. Changes in sizes shall be made with appropriate reducing fittings. Pipe connections shall be made in accordance with the details shown and manufacturer's recommendations. Open ends of pipe lines shall be properly capped or plugged during installation to keep dirt and other foreign material out of the system. Pipe supports and hangers shall be provided where indicated or as required to insure adequate support of the piping.

3.03 INSTALLATION OF DUCTILE IRON PIPE

A. All ductile iron pipe and fittings shall be laid in accordance with American Water Works Association Standard ANSI/AWWA C600, latest revision, entitled "Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances".

B. Restrained Joints: Restrained joints shall be provided where indicated on the Drawings. Joint assembly shall be made in strict accordance with the manufacturer's instructions, which shall be submitted to the Engineer for review and approval before commencing work.

C. Flanged Joints: Flanged joints shall be made up by inserting the gasket between the flanges. The threads of the bolts and the faces of the gaskets shall be coated with suitable lubricant immediately before installation.

1. Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe. Clean flanges by wire brushing before installing flanged fittings. Clean flange bolts and nuts by wire brushing and lubricate bolts with oil and graphite.

2. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.

3. Exercise care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.

4. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

3.04 INSTALLATION OF PVC PIPE

A. All push-on joint PVC pipe shall be installed in accordance with the pipe manufacturer's published installation guide, the AWWA Manual of Practice No. M23 "PVC Pipe - Design and Installation" and the Uni-Bell Plastic Pipe Association installation recommendations.

B. PVC Pipe Joint Assembly for Threaded and Solvent Welded Pipe:

1. All threaded and solvent welded joints shall be made watertight in accordance with ASTM D2855, ASTM D2564, and AWWA Manual M23. All pipe cutting, threading, and jointing procedures for threaded and solvent welded PVC pipe joints shall be in strict accordance with the pipe and fitting manufacturer's printed installation instructions. Thread lubricant for threaded joints shall be Teflon tape only.

2. At threaded joints between PVC and metal pipes, the metal side shall contain the socket end and the PVC side the spigot. A metal spigot shall not, under any circumstances, be screwed into a PVC socket.

3.05 INSTALLATION OF PIPE SLEEVES, WALL CASTINGS, AND COUPLINGS

A. Pipe sleeves and wall castings shall be provided at the locations called for on the Drawings. These units shall be as detailed and of the material as noted on the Drawings. They shall be accurately set in the concrete or masonry to the elevations shown. All wall sleeves and castings required in the walls shall be in place when the walls are poured. Ends of all wall castings and wall sleeves shall be of a type consistent with the piping to be connected to them.

B. Link seals for wall sleeves shall be installed in strict accordance with the manufacturer's printed installation instructions. For watertight applications in tanks, the link seal installation shall be tested hydrostatically for leaks at the same time as the tank. Any leaks that occur during the test period shall be repaired by checking the link seals for proper installation and replacing of units found to be defective at no additional cost to the City.

C. Pipe couplings shall be installed in strict accordance with the manufacturer's published instructions and recommendations.

3.06 INSTALLATION OF VALVES

A. Valves of the size and type shown on the Drawings shall be set plumb and installed at the locations indicated on the Drawings. Valves shall be installed in accordance with manufacturer's installation instructions and with the details shown on the Drawings.

B. Valves shall be installed such that they are supported properly in their respective positions, free from distortion and strain. Valves shall be installed such that their weight is not borne by pumps and equipment that are not designed to support the weight of the valve.

C. Valves shall be carefully inspected during installation; they shall be opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Check and adjust all valves for smooth operation.

D. Install valves with the operating stem in either horizontal or vertical position.

E. Allow sufficient clearance around the valve operator for proper operation.

F. Clean iron flanges by wire brushing before installing flanged valves. Clean carbon steel flange bolts and nuts by wire brushing, lubricate flange bolt threads with oil or graphite, and tighten nuts uniformly and progressively. Clean threaded joints by wirebrushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

G. For buried valves, a valve box shall be centered accurately over the operating nut and the entire assembly shall be plumb. The tops of valve boxes shall be adjusted to the proper elevation as specified below and as shown on the Drawings.

H. Valves shall be tested hydrostatically, concurrently with the pipeline in which they are installed. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the pressure used for the pressure tests. If valve joints leak during pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and hydrostatically retest the joints.

I. Following installation, all above-ground valves shall be painted in accordance with the painting system specified on Drawings.

3.07 PRESSURE TEST

A. Hydrostatic Pressure and Leakage Testing - See Section 15044.

3.08 OBTAINING POTABLE WATER FOR TESTING AND FLUSHING

A. The potable water supply shall be protected with an air gap or a reduced pressure principle backflow preventer approved by the City, if potable water is used for testing and flushing.

B. To obtain potable water service during construction, the Contractor shall be required to install a temporary water meter, if public supply is available. The piping, fittings, backflow preventer, and appurtenances required for the temporary construction water service shall be supplied by the Contractor.

C. The Contractor shall coordinate with the City for temporary construction water service connection, usage, and flushing.

3.09 MAIN CLEANING AND FLUSHING

A. Following the hydrostatic and leakage tests, all the mains constructed under this contract shall be cleaned and flushed to remove sand, loose dirt, and other debris. Flushing velocity shall be a minimum of 2.5 fps. Flushing shall continue until clean water flows from the main. However, the Contractor shall endeavor to use the minimum amount of flushing water required to complete the work.

B. Temporary blowoffs may be required for the purpose of flushing mains. Temporary blowoffs shall be installed as close as possible to the ends of the main being flushed. Blowoffs installed on the main shall be the same diameter as the main. Temporary blowoffs shall be removed and plugged after the main is flushed. Installing and removing temporary blowoffs shall be at no additional cost to the City.

C. The City shall be notified at least 72 hours prior to flushing mains.

D. Blowoffs and temporary drainage piping used for flushing shall not be discharged into any gravity sewer or pumping station wet well. The Contractor shall obtain prior approvals from the Engineer and the City as to the methods and locations of flushing water discharge.

END OF SECTION

SECTION 15064

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish all labor, materials, equipment and incidentals required and install and test all polyvinyl chloride (PVC) piping, fittings and appurtenances as shown on the Drawings and specified herein.

B. General Design: The equipment and materials specified herein are intended to be standard types of PVC pipe and ductile iron fittings for use in transporting wastewater, reclaimed water, and water.

1.02 QUALITY ASSURANCE

A. Qualifications: All of the PVC pipe and ductile iron fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. The pipe and fittings shall be designed, constructed, installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

B. Standards:

1. AWWA C900/C905

2. ASTM D1784 / D1785 / D2241 / D2466 / D2564 / D2729 / D2774 / D3034 / D3139 / D3212

3. NSF 14

4. UNI-B-1 through 5

C. Factory Tests: The manufacturer shall perform the factory tests described in Section 3 - AWWA C900/C905.

D. Quality Control:

1. The manufacturer shall establish the necessary quality control and inspection practice to ensure compliance with the referenced standards.

2. In addition to the manufacturer's quality control procedures, the County may select an independent testing laboratory to inspect the material at the production facility for compliance with these specifications. The County will pay for the cost of facility inspection requested by the County.

1.03 SHOP DRAWINGS AND SUBMITTALS

A. Submittals shall be submitted to the County/Professional for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01340 “Shop Drawings”.

B. Materials and Shop Drawings

C. Manufacturer's Certification: Submit sworn certification of factory tests and their results.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with the manufacturer's recommendations. PVC pipe shall be covered with black plastic with a minimum thickness of 15-mil. Joint gaskets shall be stored in a clean, dark and dry location until use.

B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage to the pipe or fittings and their respective coatings. Pipe or fittings shall not be rolled off the carrier or dropped. Pipe shall be unloaded by lifting with a forklift or crane. All pipe or fittings shall be examined before installation and no piece shall be installed which is found to be defective. Pipe shall be handled to prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of County or it shall be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on level ground, graded to eliminate all rock points and to provide uniform support along the full pipe length. When being transported, the pipe shall be supported at all times in a manner to prevent distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of the County, is damaged beyond repair by the Contractor shall be removed from the site.

C. The Contractor shall be responsible for all materials furnished and stored until the date of project completion. The Contractor shall replace, at his expense, all materials found to be defective or damaged in handling or storage. The Contractor shall, if requested by the County, furnish certificates, affidavits of compliance, test reports, samples or check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

A. Polyvinyl Chloride (PVC) Pipe

1. Standards: AWWA C900/C905 and ASTM D1784/D3034/F679 (Gravity Sewer).

2. Compounds: Class 12454-A or Class 12454-B.

3. PVC Gravity Pipe and Fittings: PVC gravity pipe (6-inch to 15-inch), shall conform to ASTM D3034, maximum SDR 26. PVC gravity pipe (18-inch to 36-inch), shall conform to ASTM F679 and uniform minimum "pipe stiffness" at 5% (percent) deflection shall be 46-psi. The joints shall be integral bell elastomeric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI Bell Plastic Pipe Association standard is UNI B.

4. PVC Pressure Pipe and Fittings: All PVC pipe of nominal diameter 4 to 12-inches shall be manufactured in accordance with AWWA Standard C900 and greater than 12-inches shall be manufactured in accordance with AWWA Standard C905. The PVC pipe shall have a minimum working pressure rating of 100-psi and shall have a maximum dimension ratio of 18. Pipe shall be the same outside diameter as ductile iron pipe.

5. Dimension Ratio/Thickness: (unless otherwise shown on the Drawings)

B. Raw Wastewater:

1. Pressure Systems: DR 18

2. Gravity Systems: SDR 26 (ASTM D3034) or PS 46 (ASTM F679)

a. Treated Wastewater: DR 18

b. Reclaimed Water: DR 18

c. Raw Water: DR 18

d. Potable Water: DR 18

e. Irrigation Piping: Schedule 40 or SDR 21

3. Joints:

a. Push-on integral bell elastomeric gasket joints:

(1) Standards: ASTM D3212/D3139/F477 and UNI-B-1

(2) Gaskets:

Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) rieber type.

Wastewater Service: Styrene Butadiene Rubber (SBR) rieber type for C900 / C905 pipe. Styrene Butadiene Rubber (SBR) ring type for gravity systems.

(3) Pipe Markings: Pipes shall have a manufacturer's home-mark on the spigot. On field cut pipe, the Contractor shall provide home-mark on the spigot in accordance with manufacturer's recommendations.

b. Solvent weld (nominal diameter less than 4-inches):

(1) Standards: ASTM D2466/D2564

(2) Type: Slip Fitting Socket (tapered)

(3) Exclusions: Plastic saddle and flange joints will not be used.

c. Restrained Joints:

(1) Restrained joint devices shall be made specifically for PVC pipe and meet or exceed the requirements in ASTM F-1674.

(2) Manufacturers: Uni-flange mechanical joint restraints and bell restraints (for all sizes); Meg-a-lug system as manufactured by EBBA Iron (sizes 12-inches or less), or acceptable equal.

(3) Design pressure rating equal to or above test pressure as specified herein.

d. Pipe Length:

(1) Pressure systems: 20-feet maximum nominal length

(2) Gravity systems: 13-feet minimum nominal length

4. Fittings - Pressure Systems (nominal diameter 4-inches and greater):

a. Materials: Ductile iron

b. Joints: Mechanical Joint, Minimum 350-psi pressure rating

5. Gaskets:

a. Water and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) ring type

b. Wastewater Service: Neoprene rubber ring type

6. Exclusions: Standard double bell couplings will not be acceptable where the pipe will slip completely through the coupling.

7. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53, latest revision, and shall be ductile iron.

8. All fittings shall have a date code cast (not printed or labeled), with identification of the date, factory and unit at which it was cast and machined. Fittings shall have distinctly cast on them the pressure rating, nominal diameter of openings, manufacturer's name, the country where cast, and deflection angle. Ductile iron fittings shall have the letters "DI" or "Ductile" cast on them.

9. All potable water main fittings shall have NSF certification and ISO 9001 certification for both the foundry and manufacturer. The NSF 61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for potable water applications.

(1) All ductile iron fittings shall have exterior coatings, including markings and colors, and interior linings in conformance with Section 15050 "Utility Piping, Fittings, Valves, and Accessories."

C. Fittings - Pressure Systems (nominal diameter less than 4-inches)

1. Material: Polyvinyl Chloride (PVC)

2. Joints: Slip fitting tapered socket with solvent weld

3. Solvent: Sure Guard 12 or acceptable equal

4. Exclusions: Plastic saddle and flange joint fittings shall not be used

2.03 LOCATION MARKERS, LOCATION WIRE AND IDENTIFICATION MARKINGS

A. Electronic Markers and Locator System (for reclaimed water and wastewater ONLY)

1. Markers: Markers shall consist of a passive device capable of reflecting a specifically designated repulse frequency tuned to the utility (service) being installed. Markers shall be color coded in accordance with the American Public Works Association's "Utility Locating and Coordinating Council Standards." Colors shall be: Wastewater and Reclaimed Water - #1404 Green. Markers shall be full range. Markers shall be installed directly above the centerline of the respective pipeline at intervals not to exceed 100-feet, at each fitting (tees, wyes, crosses, reducers, plugs, caps and bends) or change in horizontal direction and at each valve along the pipeline. Markers shall be hand backfilled to 1-foot above the pad and have a finished depth of burial of not less than 2-feet or more than 6-feet. No separate payment shall be made for furnishing and installing the respective frequency and color-coded electronic pad type marker.

2. Locator System: Marker locator set shall be the 3M Dynatel 1420 or 3M Dynatel 1420E Electronic Marker System Marker Locator, or acceptable equal. The Contractor shall furnish 1 locator set for each type of service piping installed on the Project (i.e.: reclaimed water, wastewater.) to the County. Each unit shall incorporate the following features and accessories:

3. Unit(s) shall be tuned to the proper frequency for each type (service) of piping.

4. Field strength meter that provides visual indication of the return signal

5. Function switch for selection of operation mode

6. Sensitivity control to adjust the receiver gain

7. Audio speaker for signal response

8. Battery access panel containing condensed operating instructions

9. Auxiliary headset and heads set jack

10. Permanently attached shoulder straps

11. Rugged shockproof and weatherproof storage/carrying case

12. Manufacturer: System shall be Scotch Mark Locator System, or acceptable equal.

B. Location Detection Wire

1. Materials: Continuous, insulated 10-gauge copper wire (color to match pipe identification).

2. Installation: Directly above (1-inch maximum) centerline of pipe terminating at top of each valve box collar and be capable of extending 18-inches above top of box (stored inside the 2-inch brass pipe through the valve box collar) in a manner so as not to interfere with valve operation. For direction drilling installations, a minimum of 2 (two) 10-gauge wires shall be pulled along with the pipe.

C. Identification Markings:

1. Pipe furnished in solid color or white with color lettering as indicated below.

a. Lettering along top 90° (degrees) of pipe, minimum 3/4-inch in height with appropriate wording appearing 1 or more times every 21-inches along the entire length of the pipeline.

(1) Raw Wastewater: Safety Green

(2) Reclaimed Water: Purple (Pantone 522C)

(3) Potable Water: Safety Blue

PART 3 - EXECUTION

3.01 INSTALLATION

A. Standards: AWWA C900/C905/UNI-B 3 and 4

B. Underground Polyvinyl Chloride (PVC) Pipe and Fittings

1. Bedding: Firm, dry and even bearing of suitable material. Blocking under the pipe will not be permitted.

2. Placement/Alignment:

a. Installation shall be in accordance with lines and grades shown on the Drawings. For pressure systems, deflection of joints shall not exceed 75% of that recommended by the manufacturer.

b. All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken or otherwise defective materials are being used. All homing marks shall be checked for the proper length so as to not allow a separation or over homing of connected pipe. Homing marks incorrectly marked on pipe shall result in rejection of pipe and removal from site. The Contractor shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after installation.

c. Proper implements, tools and facilities shall be used for the safe and proper protection of the Work. Pipe shall be lowered into the trench in such a manner as to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped into trenches under any circumstances.

d. Trench Dewatering and Drainage Control: Contractor shall prevent water from entering trench during excavation and pipe laying operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.

e. Pipe Laying in Trench: Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and re-laid. Pigging of pipe may be used to remove foreign materials in lieu of flushing. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the County to ensure absolute cleanliness inside the pipe. The color stripe and pipe text shall be viewed from the top of pipe when installed. When installing PVC pipe, no additional joints will be installed until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.

f. Locating Wire: Locating wire, for electronically locating pipe after it is buried, or installed by trenchless technology shall be attached along the length of and installed with the pipe. This is applicable to all sizes and types of pressure mains. At a minimum, the tracing wire is to be attached to the pipe with nylon wire ties. The wire itself shall be 10-gauge single strand solid core copper wire with non-metallic insulation. The insulation shall be color coded for the type of pipe being installed. Continuous continuity must be maintained in the wire along the entire length of the pipe run. Permanent splices must be made in the length of the wire using

wire connectors approved for underground applications as listed in the uniform electric code handbook. The coiled wire shall extend to a minimum of 12-inches above the surface and be connected to a test station box at valve locations.

g. PVC Pressure Pipe Installation and Training: PVC pipe shall be installed in accordance with standards set forth in the UNI-BELL "Handbook of PVC Pipe", AWWA C605, and AWWA Manual M-23. The pipe shall be laid by inserting the spigot end into the bell flush with the insertion line or as recommended by the manufacturer. At no time shall the bell spigot end be allowed to go past the "insertion line" or "homing mark" for pressure pipe applications and homing mark shall be visible.

h. Field Cutting: PVC pipe can be cut with a handsaw or power driven abrasive disc making a square cut. The end shall be beveled with a beveling tool, wood rasp or power sander to the same angle as provided on the factory-finished pipe. The insertion line on the spigot shall be remarked to the same dimensions as the factory-marked spigot.

i. All Contractor pipe crews utilizing PVC pressure pipe shall be trained on an annual basis by Uni-Bell in coordination with the County and attended by the manufacturer's representative of the respective approved Manufacturers in Appendix D "List of Approved Products." The Uni-Bell PVC training session will consist of proper handling, storage, installation, and compaction as well as County requirements regarding PVC pipe and deflection. Every person handling, installing or backfilling PVC pipe shall not be permitted to install County owned and / or maintained pipe without training.

j. Approved manufacturer’s representatives (Appendix D "List of Approved Products"), not present at the hosted Uni-Bell training session or individuals of pipe crews not in attendance shall be trained on every project site. On-site project training shall be for each manufacturer of pipe utilized on-site, per crew and per project. Specifically each crewmember shall be trained on every project by every pipe manufactures representative regardless of previous on-site training. Every person handling, installing or backfilling PVC pipe shall not be permitted to install County owned and / or maintained pipe without training.

k. PVC Gravity Pipe Installation: Gravity sewer pipe shall be installed to the homing mark, no tolerance. Any noticeable separation shall be removed and reinstalled. The homing mark may be disregarded to meet the maximum of 1-inch separation between bell and spigot requirement. Joints:

I. Joint Placement:

(1) Push on joints: Pipe shall be laid with the bell ends facing upstream. The gasket shall be inserted and the joint surfaces cleaned and lubricated prior to placement of the pipe. After joining the pipe, a metal feeler shall be used to verify that the gasket is correctly located.

(2) Mechanical Joints: Pipe and fittings shall be installed in accordance with the "Notes on Method of Installation" under ANSI A21.11/AWWA C111. The gasket shall be inserted and the joint surfaces cleaned and lubricated with soapy water before tightening the bolts to the specified torque.

C. Thrust Restraint

1. Thrust restraint shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein.

2. Length of restrained joints shall be in accordance with the lengths listed in the table as shown on the Drawings.

D. Installation of Pipes on Curves:

1. No joint deflection or pipe bending is allowed in PVC pipe. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with sleeves and fittings.

3.02 CLEANING AND FIELD TESTING

A. At the conclusion of the Work, the Contractor shall provide all associated cleaning and field testing as specified in associated sections of these specifications.

END OF SECTION

SECTION 15065

STAINLESS STEEL PIPE AND FITTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Stainless steel tubing, piping, fittings and appurtenances.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 01 - General Requirements.
2. Section 15000 - Mechanical General Requirements
3. Section 15995 - Pipeline Testing and Disenfection

1.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Mechanical Engineers (ASME):
   a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125 and 250).
   b. B31.1, Power Piping.
2. ASTM International (ASTM):
   a. A182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
   b. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
   c. A312, Standard Specification for Seamless, Welded, and Heavy Cold Worked Austenitic Stainless Steel Pipes.
   d. A320, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service.
   e. A530, Standard Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe.
   f. A774, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
   g. A778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.

1.03 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

3. Fabrication details and welding procedure specifications for all work to be done under this Specification Section.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Tubing:

1. ASTM A269.

2. Filler material: Extra low carbon (ELC) with 0.03 percent maximum carbon.

B. Pipe:

1. ASTM A778.

2. ASTM A312.

C. Pipe Fittings:

1. ASTM A774.

D. Flanges:

1. Flat faced.

2. Welding neck or slip on type.

3. ASTM A182, Type 316L.

E. Nuts, Bolts and Washers:

1. ASTM A320, Type 316.

2. Two (2) nuts provided for 1 IN DIA bolt applications and larger.

F. Elastomeric Bellows Type Expansion Joint (for hot air service):

1. Manufacturers:

a. Mercer Series 500 or equal.

2. Two Arch construction.

3. Material: EPDM (tube and cover)

4. Restraint: Provide control rods sized to restrain joint at test pressure.

a. Materials: 316 stainless steel.

5. Allow for minimum of 1 IN of lateral movement.

6. Pressure Rating: Working pressure of joint equal or greater than test pressure of connecting piping. Provide minimum 25 psig rating.

G. Gasket Material, unless noted otherwise on individual piping system:

1. Rubber or neoprene.

2. Temperature rating of 250 DegF.

H. Flexible Metal Hose:

1. General: Braided stainless steel flexible hose.

2. Connections: Provide ANSI 125 flanged connections.

3. Length: Minimum 12 IN or as noted on the Drawings.

4. Pressure: Working pressure of hose equal or greater than test pressure of connecting piping.

I. Welders Americans Welding Society (AWS) current certification and five projects of similar nature for approval by Engineering and City.

2.02 FABRICATION

A. All tube, piping, fitting product to be immersion pickled subsequent to manufacturing and fabrication operations and prior to shipping.

1. Pickling solution of 6-10 percent nitric acid and 3-4 percent hydrofluoric acid.

2. Temperature and exact concentrations to be such only a modest etch is produced but all oxidation and ferrous contamination is removed from metal surface.

3. All pickling solution residues are to be neutralized after pickling.

B. Diameter tolerance and wall thickness tolerance are to conform to ASTM A530.

C. Joints:

1. Shop welded circumferential buttweld joints.

2. ASME B16.1, Class 150.

D. Elastomeric Bellows Type Expansion Joints:

1. Ensure aerial travel in expansion joints of 3.1 IN minimum for 15,000 cycles or 5.2 IN for 1000 cycles.

2. Furnish each assembly with a minimum of two control tie rods.

3. Fabricate with 125 LB flanged end connections.

E. Expansion Joints:

1. Fabricate for 15 psi internal pressure and 250 DegF operation.

2. Ensure aerial travel in expansion joints of 3.1 IN minimum for 15,000 cycles or 5.2 IN for 1000 cycles.

3. Furnish each assembly with minimum four control tie rods.

4. Fabricate with 125 LB flanged end connections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation, inspect and verify condition of piping and appurtenances.

1. Installation constitutes installer's acceptance of condition for satisfactory installation.

3.02 PREPARATION

A. Correct defects or conditions which may interfere with or prevent a satisfactory installation.

B. Ensure ends of pipe to be fitted with flanges have all protrusions ground flush.

3.03 INSTALLATION

A. Ensure all pipe cutting, threading and jointing conforms to requirements of ASME B31.1.

1. Lubricate all pipe threads with Teflon tape.

B. Welding:

1. Provide welds sound and free from embedded scale or slag, and tensile strength at weld not less than pipe.

2. Perform butt welds only with an inert gas shielded process.

3. Adequate inert gas protection is to be provided to the top and under or backside of the weld to protect from atmospheric contamination.

4. Filler metal is to be applied to all manually-performed welds appropriate for the base material being welded.

5. Only inert gas shielded welding processes are to be used for spool fabrication.

6. Provide butt welds with 100 percent penetration to the interior or back side of the weld joint.

7. Weld reinforcement on both sides of the weld are to be smooth, uniform and no more than 1/16 IN in height.

C. Joining Method - Flanges:

1. Leave 1/8 IN to 3/8 IN flange bolts projecting beyond face of nut after tightening.

a. Coordinate dimensions and drillings of flanges with flanges for valves, equipment, and other systems.

b. Tighten bolts evenly around pipe until following range of torques is achieved:

BOLT SIZE, IN	RANGES OF TORQUE, FT/LBS
5/8	40 - 60
3/4	60 - 90
1	70 - 100
1-1/4	90 - 120

D. Expansion Joints:

1. Install in accordance with manufacturer's instructions.
2. Apply anti-seize compound to all exposed steel threads.

3.04 FIELD QUALITY CONTROL

A. Test piping systems in accordance with Specification Section 15995.

3.05 CLEANING

1. Clean interior of piping systems thoroughly before installing.
2. Maintain pipe in clean condition during installation.
3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.
5. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
   a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
   b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.

B. Clean in accordance with Specification Section 15995.

END OF SECTION

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SECTION 15126

HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish and install all pipe supports as indicated and as specified herein.

B. Number and Location: The Drawings depict only minimum pipe support locations. Adequate pipe supports shall be supplied for all piping systems to provide a rigid overall installation and additional support for pipe ends when equipment is disconnected.

C. Related Work Described Elsewhere:

1. Drawings and Submittals: Section 01420.
2. Concrete: Division 3.
3. Metals: Division 5.
4. Painting: Section 09900.
5. Mechanical: Division 15.

1.02 SUBMITTALS

A. Submit manufacturer's descriptive literature for all pipe support devices and materials demonstrating compliance with this Specification and the support details shown on the Drawings in accordance with Section 01420.

PART 2 - PRODUCTS

2.01 PIPING SUPPORTS FOR DUCTILE IRON PIPE

A. Furnish and install supports necessary to hold the piping and appurtenances in a firm, substantial manner at the lines and grades indicated on the Drawings or specified. Piping supports and hangers shall conform to Federal Specification WW-H-171 or shall be as shown or indicated on the Drawings. Piping within structures shall be adequately supported from floors, walls, ceilings, or beams. Supports from the floor shall be approved flange supports, saddle stands or suitable concrete piers as indicated or approved. Pipe saddles shall be shaped to fit the pipe with which they will be used and shall be capable of screw adjustment.

B. Concrete piers shall conform accurately to the bottom 1/3 to 1/2 circumference of the pipe. Piping along walls shall be supported by approved wall brackets with attached pipe rolls or saddles or by wall brackets with adjustable hanger rods. For piping supported from the ceiling, approved rod hangers proportioned for the size of pipe to be supported and of a type capable of screw adjustment after erection of the pipeline, with suitable adjustable concrete inserts or beam clamps, shall be used. The use of perforated band iron strap (plumber's strap), wire, or chain as pipe hangers will not be acceptable. If required, piping supports shall be placed so as to provide a uniform slope in the pipe without sagging. Supports shall be located wherever necessary in the opinion of the Engineer; however, in no case shall the spacing between supports exceed the dimensions shown on the Drawings or recommended by the pipe manufacturer. Adequate supports shall be used adjacent to valves and fittings in pipelines. Fabricated steel or cast iron pipe supports, saddles, rolls, brackets and the like shall be as manufactured by Grinnell, B-Line, or an equal approved by the Engineer.

C. All fabricated steel or cast iron pipe supports, saddles, rolls, brackets, devices, and the like shall be hot-dip galvanized after fabrication and/or machining in accordance with ASTM A123. All nuts, bolts, clips and other hardware, and all hanger rods used for pipe supports, shall be Type 316 stainless steel. All nuts, bolts and threaded rods shall be in accordance with ASTM A320, Class 2. All such devices shall be painted in accordance with Section 09900: Painting, after installation.

2.02 PIPE SUPPORTS FOR SMALL DIAMETER PIPE

A. Small diameter piping (4 inches in diameter and smaller) shall be supported with Type 316 stainless steel (for interior or exterior use) and/or fiberglass reinforced plastic (for interior use only) pipe supports. Hardware used for pipe supports shall be Type 316 stainless steel. Channel framing support systems shown on the Drawings shall be as manufactured by Aickenstrut, Unistrut, or approval equal.

B. In some cases, to adequately support small diameter PVC, steel, or copper piping, a frame support structure may be required. Where required or shown on the Drawings, frame support structures shall be constructed using channels, fittings, brackets, hardware, and other accessories.

C. Pipe supports for small diameter piping shall be located wherever necessary in the opinion of the Engineer to adequately support the pipe; however, they shall have a maximum spacing as specified hereinafter for straight pipe runs. Adequate supports shall be used adjacent to valves and fittings in pipelines.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Install hangers or supports at all changes in direction at the spacing requirements stated herein and at the end of piping runs to minimize the stresses imposed on piping, valves, associated equipment and appurtenances.

2. Piping support systems and accessories shall be installed in accordance with the manufacturer's installation instructions.

3. Install all hangers, supports, rods, inserts, clamps, bolts and other supporting devices of sizes and spacings to prevent loads from exceeding the manufacturer's maximum recommended loading with a safety factory of 5.

4. Secure hangers to beams or approved concrete inserts where possible.

5. When piping is installed on structural steel supports, provide blocking of pipe rolls to prevent lateral pipe movement.

6. Do not support piping from other pipes or from stairs and walkways.

7. Where possible, set all inserts or anchor bolts before concrete is placed.

B. Expansion and Contraction:

1. Rigidly support all piping with adequate provisions for expansion and contraction.

2. Firmly anchor horizontal runs over 50 feet in length at the midpoint of the runs to force expansion equally toward the ends.

C. Spacing:

1. Install hangers and supports at sufficiently close intervals to maintain alignment and prevent sagging.

2. The following table is based on spacing requirements for hard drawn copper tube, Class 53 DIP, Schedule 80 PVC, or Standard Weight (Schedule 40) steel pipe carrying a fluid with a specific gravity of 1.0 at a temperature not exceeding 120 degrees F. Support spacing for other pipe materials or for piping carrying fluids with specific gravities or temperatures exceeding those stated above shall be approved by the Engineer. Maximum spacing of hangers and supports shall be as follows:

Nominal Pipe Diameter, (inches)	Support Spacing, Feet			
	Copper	Ductile Iron	Plastic	Steel
1/2	4.0	N/A	3.5	4.5
3/4	4.0	N/A	4.0	5.0
1	4.0	N/A	4.5	5.5
1-1/4	6.0	N/A	5.0	6.5
1-1/2	6.0	N/A	5.0	7.5
2	6.0	N/A	5.5	8.0
2-1/2	6.0	N/A	5.5	8.0
3	6.0	N/A	6.0	8.0
4	N/A	8.0	7.0	8.0
Larger than 4	N/A	See Note	N/A	See Note

Note: Spacing shall be 10 feet maximum but may be increased depending on pipe size. Refer to AWWA standard of practice.

D. Supporting Vertical Piping:

1. Support at a maximum of 10 feet spacing.

2. Support at all points necessary to insure rigid installation with adequate provisions to allow expansion and contraction and prevent vibration.

3. Support by approved pipe collars, clamps, brackets, or wall rests.

E. Supporting PVC Pipe:

1. Support in strict accordance with the manufacturer's instructions and recommendations for the conditions of operation, temperature, and size of pipe.

2. Support in a manner which will prevent subsequent visible sagging of the pipe between supports due to plastic deformation.

F. Drain, Waste and Vent Piping: Support by adjustable hangers.

G. Valves, Fittings and Specialties: Independently support pipe, valves and specialties connected to pumps and equipment.

H. Temporary Pipe Supports:

1. Lay out each section of pipeline and make connections while the pipe is held in temporary supports.

2. After the completion of connections in each section of pipeline, hold the section in place with temporary clamps.

3. Do not remove the temporary clamps until the piping is correctly installed on the permanent supports.

3.02 PAINTING

A. All fabricated steel or cast iron pipe supports, saddles, brackets, rolls, clevises and the like shall be painted, after installation, as specified in Section 09900.

END OF SECTION

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SECTION 15995

PIPELINE TESTING AND DISINFECTION

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall perform flushing and testing of all pipelines and appurtenant piping, complete, including conveyance of test water from City-designated source to point of use and all disposal thereof, all in accordance with the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ANSI / AWWA B300	Hypochlorites
ANSI / AWWA B301	Liquid Chlorine
ANSI / AWWA C651	Disinfecting Water Mains

1.03 SUBMITTALS

A. A testing schedule, including proposed plans for water conveyance, control, and disposal shall be submitted in writing for approval a minimum of seven (7) days before testing is to start.

B. The Contractor shall submit disinfection test reports and hydrostatic test reports in accordance with Sections 01340, 01700 and 15995.

PART 2 - PRODUCTS

2.01 MATERIALS REQUIREMENTS

A. All equipment, temporary valves or bulkheads, temporary vents or drains, pumps, piping, gauges or other water control equipment and materials required for testing of mains shall be furnished, installed and operated by the Contractor subject to the City's review. No materials shall be used which would be injurious to the construction or its future function.

B. Pumps shall be of a non-pulsating type suitable for this application and gauge accuracy certification may be required at the Engineer of Record's discretion.

C. All pressure and leakage testing shall be done in the presence of a representative of the City as a condition precedent to the approval and acceptance of the system.

D. All water mains shall be flushed to remove all sand, debris, rock and other foreign matter. Dispose of the flushing water without causing a nuisance or property damage.

PART 3 - EXECUTION

3.01 GENERAL

A. Notify the Engineer and City 48 hours in advance to obtain City's approval to commence testing and/or disinfection of any particular structure and/or pipeline. System isolation shall not be performed by the Contractor unless notification and approval has been obtained from the City.

B. Unless otherwise provided herein, water for flushing and testing pipelines will be furnished by the City; however, the Contractor shall make all necessary provisions for conveying the water from the City-designated source to the points of use.

C. All pressure and gravity pipelines shall be tested. All testing operations shall be performed in the presence of the City.

3.02 FLUSHING AND CLEANING

A. At the conclusion of the installation work, the Contractor shall thoroughly clean all new liquid conveying pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered the pipe during the construction period. If after this cleaning any obstructions remain, they shall be corrected by the Contractor, at his own expense, to the satisfaction of the City. Liquid conveying pipelines shall be flushed at the rate of at least 2.5 feet per second for a duration suitable to the City or shall be flushed by other methods approved by the City.

B. After the pipelines are cleaned and if the groundwater level is above the pipe, or following a heavy rain, the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired or replaced by the Contractor.

3.03 HYDROSTATIC TESTING OF PIPING (WATER AND FORCE MAINS)

A. Following pipeline flushing, the Contractor shall hydrostatically test all pipelines either in sections or as a unit. The section of main being tested shall be limited to a maximum length of 2000 feet or as required per FDEP or DOH standards and specifications. No section of the pipeline shall be tested until all field-placed concrete or mortar has attained an age of 14 days. The test shall be made by closing valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water.

B. The Contractor shall provide all reaction blocking and necessary plugs and caps required to test all piping installed as part of this Contract. The Contractor shall supply and install temporary air release valves for purposes of facilitating proper hydrostatic testing conditions. Location of the ARV's shall be as per the instructions given by the Engineer. The Contractor shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe. Care shall be taken to see that all air vents are open during filling. The Contractor shall be responsible for removing temporary ARV's, reaction blocking and

temporary plugs and caps upon the successful completion of the testing and shall be responsible for all associated site restorations resulting from his/her work.

C. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb what water it will and to allow the escape of air from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the City shall be taken.

D. The hydrostatic test shall consist of holding a test pressure of 150 psi on the pipeline for a period of 2 hours and in accordance with ANSI/AWWA Standard C605-05. All visible leaks shall be repaired in a manner acceptable to the City.

E. The maximum allowable leakage shall be determined by the following formula:

$$L = \frac{S \cdot D \cdot \sqrt{P}}{148{,}000}$$

Where:
L = Allowable leakage for system in gallons per hour
D = Pipe diameter in inches
S = Length of lines in lineal feet
P = Average test pressure in psi

F. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallon / hour / inch of nominal valve size shall be allowed. Any questions pertaining to procedures used during the test shall be decided by the Engineer.

G. The test is usually maintained for two hours, but it may be continued for one additional hour if it becomes apparent that the leakage is equal to or greater than the amount allowable. Water supplied to the main during the test to maintain the required pressure shall be measured by a 5/8-inch meter installed on the discharge side of the test pump, or by pumping from a calibrated container. A hose bib connection will be provided by the Contractor to accept the test gauge supplied by the Owner.

H. In the case of pipelines that fail to pass the prescribed leakage test, the Contractor shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines. No installation will be acceptable by the Owner until the leakage is less than the allowable for the system.

I. The Contractor shall submit to the City a detailed description of the testing procedures to be utilized.

3.04 DISINFECTION (POTABLE WATER LINES ONLY)

A. After the water mains have satisfied the leakage requirements, they shall be flushed through openings of the required size as detailed in ANSI/AWWA Standard C601 latest revision. The main shall then be disinfected in accordance with the provisions of the applicable sections of the above-named specifications. On main breaks, cut-ins, etc., a liberal application of calcium hypochlorite shall be made.

B. Mains shall not be put into domestic service until the necessary bacteriological samples have been approved by the applicable regulatory agencies.

C. Provide list of equipment required and a disinfection plan to execute the work of this Section.

D. Inject the required amount of disinfectant to yield a minimum chlorine content of 50 ppm into piping system.

E. Allow solution to remain in the pipes for twenty-four hours or longer, if required, to destroy all harmful bacteria.

F. Operate all valves and other appurtenances during disinfection to assure the sterilizing mixture is dispersed into all parts of the system.

G. After the solution has been retained for the required time, pipes shall be flushed and filled with municipal domestic water. Sterilizing water shall be disposed of in an approved manner. Sterilizing water shall not be allowed to flow into a waterway without reducing chlorine concentrations to a safe level. The Contractor shall be responsible for meeting all applicable requirements and acquiring all necessary permits for this work.

H. Take one bacteriological sample and test from every segment of pipeline tested. Samples shall be taken and tested on each of two successive days and at the Contractor's expense. Contractor shall submit sample to a laboratory, approved by Engineer, for testing. The disinfection process shall be repeated if laboratory test results reflect presence of harmful bacteria in the water. All testing and retesting including sampling and resampling as necessary will be at the Contractor's expense.

I. The Contractor shall be responsible for coordination with Broward County Health Department, who shall collect and test samples from main. The Contractor shall provide assistance to the Health Dept. for the collection of samples or pay for a certified lab to take the samples and follow all sampling procedures. The samples shall be taken from each main or section of main to be placed in service where designated by the Health Dept. The samples must be approved by the Health Department before the main is placed in service.

J. The Contractor shall be responsible for any rechlorination and retesting that may be required until the Health Department's approval is obtained. The Contractor shall be responsible for the disposal of all water flushed from the system and shall safeguard all adjoining properties from damage from flooding. The Contractor shall exercise due care in the protection of private property from water damage due to his operations. In

addition, the Contractor shall assume complete liability for any damage which was directly or in-directly caused by his operations.

3.05 BACTERIOLOGICAL ANALYSES

A. Provide analysis of treated water to meet standards and received acceptance from the Broward County Health Department.

B. Test samples in accordance with AWWA C601.

C. Quality Assurance: Testing Laboratory: Certified for examination of drinking water in compliance with applicable legislation of the State of Florida.

D. Regulatory Requirements: Conform the Florida Administrative Code.

E. Submittals

1. Submit name of testing laboratory and evidence of qualification.

2. Submit three copies of reports.

F. Project Record Documents – Comply with Section 01720.

1. Bacteriological report; accurately record:

a. Date issued, project name, and testing laboratory name, address, and telephone number.

b. Time and date of water sample collection.

c. Name of person collecting sample.

d. Test locations.

e. Initial and twenty-four- hour disinfectant residuals in ppm for each outlet tested.

f. Coliform bacteria test results for each outlet tested.

g. Certification that water conforms, or fails to conform to bacterial standards of State of Florida.

h. Bacteriologist's signature.

3.06 TESTS FOR DRAIN AND GRAVITY SEWER LINES:

A. Drain and gravity sewer lines shall be tested for infiltration and exfiltration.

B. The allowable limits of infiltration or exfiltration (leakage) for the drain or sewer lines, or any portion thereof, shall not exceed the greater of the following:

1. 100 gallons per inch of internal pipe diameter per mile of pipe per 24 hours with no allowance for laterals or manholes.

2. As required by the Broward County Health Department/FDEP permit.

3. As per the Recommended Standards for Wastewater Facilities (latest edition). Duration of test shall be a minimum of two hours.

C. The system may be tested for infiltration or exfiltration in whole or in parts, as directed by the Engineer. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of testing. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, or by other approved methods.

D. The exfiltration test will be conducted by filling the portion of the system being tested with water to a level which will provide a minimum head of 2-feet in a lateral connected to the test portion, or in the event there are no laterals in the test portion, a minimum difference in elevation of 5-feet between the crown of the highest portion of the drain or sewer and the test level.

END OF SECTION

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Provide all labor, materials, tools, supplies, equipment, and temporary utilities to complete the work shown on the Drawings and specified herein for the pumping stations. All systems are to be completely installed and fully operational. Specifically, the work includes, but is not limited to:

1. Electric services, secondary feeders, branch circuits, all connections to controls, and equipment

2. Installation of underground conduits and splices

3. Complete power and control systems

4. Complete grounding system including system and equipment

1.02 RELATED DOCUMENTS

A. The general provisions of the Contract, including General Conditions and Special Conditions, apply to all the work specified herein.

1.03 LAWS, PERMITS, FEES AND NOTICES

A. Secure and pay all permits, fees, and licenses necessary for the proper execution and completion of the work. Only City permit fees will be paid for by the city. Submit all notices and comply with all laws, ordinances, rules and regulations of any public agency bearing on the work. Contractor shall be a licensed electrical contractor in the county of construction.

1.04 DEPARTURES

A. If any departures from the Contract Drawings of Specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practicable to the ENGINEER for advance written approval.

1.05 BASIS FOR WIRING DESIGNS

A. The Contract Drawings and Specifications describe specific sizes of switches, breakers, fuses, conduits, conductors, motor controllers 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 that differs from the Drawings and

Specifications, the wiring for such equipment shall be changed to proper sizes to match at no additional expense to the OWNER.

1.06 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 cables, conduits, pull boxes, circuit numbers, and other information required by the ENGINEER.

1.07 EXCAVATING FOR ELECTRICAL WORK

A. General – Excavation or drilling, backfill and repair of paving and grassing shall be in the bid of the electrical contractor. The actual work need not be performed by electrical trades. 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 OWNER and ENGINEER shall be immediately notified, and damage shall be immediately repaired.

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.

1.08 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, but which are not shown on the Drawings or described within these Specifications.

1.09 CODES AND STANDARDS

A. 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 Underwriters' Laboratories, Inc. This applies to materials which are covered by U.L. standards.

2. NEC – National Electrical Code (NFPA-70-2014)

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. Florida Building Code

1.10 ELECTRICAL SUBMITTALS

A. The CONTRACTOR shall submit shop drawings, samples and certificates in accordance with the Special Conditions for additional instructions on substitutions. 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.

B. Shop drawings and manufacturer’s data sheets are required for all electrical materials. Samples are to be supplied for any substitute as requested by the ENGINEER.

C. 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 equipment or materials without approval from the ENGINEER.

1.11 OPERATION AND MAINTENANCE MANUALS

A. The CONTRACTOR shall submit Operation and Maintenance (O&M) Manuals in accordance with Division 1, General Requirements. O&M Manuals must contain, but are not limited to, the following:

1. Brief description of system and basic features

2. Manufacturer's name and model numbers of all components of the system

3. List of local factory authorized service companies

4. Operating instructions, including preparation for starting up, seasonal changes, shut down and service

5. Maintenance instruction

6. Possible breakdowns and repairs

7. Manufacturer's literature describing each piece of equipment

8. Control diagrams by the control manufacturer

9. Description of sequence by the control manufacturer

10. Parts list

11. Wiring diagrams

1.12 SPARE PARTS

A. Submit in accordance with Division 1, General Requirements, a list of Recommended Spare Parts for all major items of equipment. Include descriptions of each part, part number, and cost.

1.13 PROJECT DOCUMENTS

A. For "As Built" drawing requirements, see Division 1.

B. In addition, each "As Built" single line diagram shall be framed under glass and mounted on wall near respective contactors and controls.

PART 2 - PRODUCTS

2.01 GENERAL

A. Electrical Temporary Facilities – The CONTRACTOR shall include in his bid the cost of furnishing, installing and maintaining 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. 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. All reasonable safety requirements shall be observed to protect workers and the public from shock and fire hazards.

1. Ground fault interrupters shall be employed in accordance with Codes.

2. Ground wires are required in all circuits. Ground poles are required on all outlets. All metallic cases shall be grounded.

3. Rain-tight cabinets shall be used for all equipment employed in wet areas.

2.02 ELECTRICAL PRODUCTS

A. 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 purpose and rating shall be interchangeable throughout the project.

B. All products shall be newly manufactured. Defective equipment or equipment damaged in the course of the installation or a test shall be replaced or repaired in a manner meeting the approval of the ENGINEER, at no additional expense to the OWNER.

2.03 SUBSTITUTIONS

A. Comply with instruction in the Contract General Conditions and Special Conditions regarding substitutions.

2.04 ELECTRICAL IDENTIFICATION

A. Color Coding – Conductor colors shall be in accordance with NEC and NEMA requirements. Refer also to applicable sections of these specifications. Three-phase feeder and branch circuits shall be identified as follows:

120 / 240	**277 / 480**
A – Black	A – Brown
B – Red	B – Orange
C – Blue	C – Yellow
N - White	N – Gray
Green or bare for grounding conductors	
Green with Yellow trace for Special Grounding	

2.05 NAMEPLATE

A. 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, transformers, receptacles, wall switches, high voltage boxes, and cabinets. All light switches and outlets shall carry a phenolic plate with the supply circuit number. Electrical systems shall be identified at junction and pull boxes, terminal cabinets and equipment racks.

B. 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 / 480 V, 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 P.B. station nameplates for that machine. 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 1/4 inch high, unless otherwise detailed on the drawings. Nameplates shall be securely fastened to the equipment with No. 4 Phillips, rough-head, cadmium-plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be nonferrous 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 enamel. Equipment nameplate schedule for all equipment shall be submitted with shop drawing submittal for ENGINEER's approval.

C. All junction and splice boxes shall be labeled using permanent shipping tags attached to boxes, not covers.

2.06 WIRE AND CABLE IDENTIFICATION

A. 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 (paper unacceptable) tags indicating the circuit number in 3/16 inch letters. Circuit numbers shall be protected with clear shrinkable tubing.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

A. 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 OWNER's instruction for storage locations.

3.02 ELECTRICAL COORDINATION

A. The CONTRACTOR is responsible for coordination with the OWNER, ENGINEER, the power company, and the telephone company on all matters that have a bearing on the electrical work.

B. The Drawings indicate the extent, the general location, and arrangement of equipment, conduit, and wiring. Study the Drawings, including details, so the 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 spacings and locations of lighting fixtures, panelboards, cabinets, receptacles and other items of equipment provided that the overall patterns of layouts are not disrupted and remain uniform.

3.03 CUTTING AND PATCHING

A. Cut and prepare all openings, chases, and trenches required for the installation of equipment and materials. Repair, remodel, and refinish in strict conformance with the quality of workmanship and materials in the surroundings. Obtain written permission from the ENGINEER for any alterations to structural members before proceeding. All penetrations through fire walls or floor / ceiling slabs shall be sealed to maintain the fire integrity of the wall or slab.

3.04 MAINTENANCE

A. Render all necessary measures to insure 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 acceptance shall be replaced immediately at no additional cost to the OWNER.

3.05 WATERPROOFING

A. Whenever any work penetrates any waterproof area, seal and render the work waterproof. All work shall be accomplished so as not to void or diminish any waterproofing bond or guarantee.

3.06 TESTS

A. Conduct an operating test of equipment prior to the ENGINEER's approval. The equipment shall be demonstrated to operate in accordance with the requirements of these Specifications. The tests shall be performed in the presence of the ENGINEER or an authorized representative. The CONTRACTOR shall furnish all instruments, electricity and personnel required for the tests.

3.07 CLEANUP

A. Maintain 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.

END OF SECTION

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SECTION 16011

CODES & STANDARDS

PART 1 - GENERAL

1.01 THIS SECTION COVERS THE CODES, SPECIFICATIONS AND STANDARDS CONSIDERED MINIMUM REQUIREMENTS FOR MATERIALS, WORKMANSHIP AND SAFETY FOR ALL DIVISIONS 16 AND RELATED ELECTRICAL WORK.

1.02 SPECIFICATIONS, CODES AND STANDARDS

A. Reference within this Specification to standards, codes or reference specifications implies that any item, product or material so identified must comply with all minimum requirements as stated therein, except packaging and shipping, unless indicated otherwise. Only the latest revised editions are applicable.

Some of the references used in this Division are as follows:

NFPA	National Fire Protective Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
U.L.	Underwriters' Laboratories, Inc.
ANSI	American National Standards Institute
FS	Federal Specification

B. The Specifications, codes and standards indicated below and in other Sections, including the current addenda, amendments and errata, referred to by basic designation only, form a part of this specification.

NFPA-70	National Electrical Code (Current Edition)
NFPA-90A	Air Conditioning & Ventilation (Current Edition)
NFPA-101	Code for Safety to Life (Current Edition)
F.B.C.	Florida Building Code (Current Edition)

1.03 UNDERWRITERS' LABORATORIES

A. Where materials and equipment are available under the continuing inspection and labeling service of U.L.; provide such material and equipment.

B. Listing by Underwriters' Laboratories shall be evidenced by the label or:

U.L. - Electrical Construction Materials List (Green Book)
U.L. - Electrical Appliance & Utilization Equipment List
U.L. - Building Materials List

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE

A. Provide all material as required for a complete project as required by the Drawings and in this Specification.

1.2 SHOP DRAWING SUBMITTALS

A. Submit shop drawings for the following: All raceways Wiring and Splices Contactors, Relays, Photocells

PART 2 - PRODUCTS

2.1 RACEWAY

A. PVC Conduit – Underground PVC conduit shall be Schedule 80 unless otherwise noted, and shall be U.L. approved. PVC conduit shall be Schedule 80 when installed above ground.

B. Locations: – Conduit shall be used as follows:

1. All above ground grade exposed conduits shall be Schedule 80 PVC unless otherwise noted on the Drawings.

2.2 WIRE AND CONNECTORS

A. Cable shall be rated for 600 volts and shall meet the requirements below:

1. Conductors shall be stranded.

2. All wire shall be brought to the job in unbroken packages and shall bear the date of manufacturing; not older than 12 months.

3. Type of wire shall be THWN or THHN rated 75 degrees C, suitable for wet locations except where otherwise required by the drawings.

4. No wire smaller than No. 12 AWG shall be used unless specifically indicated.

2.3 BOXES

A. Conductor metal shall be copper.

B. All conductors shall be meggered after installation and insulation must be in compliance with the Insulated Power Cable Engineers Association Minimum Values of Insulation Resistance.

C. Boxes for wiring devices (switches and receptacles) installed outdoors or wet locations shall be weatherproof fiberglass with polycarbonate cover plates. Junction boxes shall be NEMA 4X construction. All boxes shall be securely mounted, plumb and level, in readily accessible locations.

D. Pull boxes in ground shall be Pencell HHPL 172012 with green lid marked "ELECTRIC".

2.4 GROUNDING

A. Grounding and Bonding – All Grounding and Bonding shall be in accordance with NFPA 70. Ground all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in raceways, and neutral conductor of wiring systems.

B. Grounding Conductor – Provide an insulated, green-colored equipment grounding conductor in all feeder and branch circuits. This conductor shall be separate from the electrical system neutral conductor. Conduits will not be approved as grounding conductor.

C. The CONTRACTOR shall install all ground rods, ground wires, and connectors as required for the complete grounding system.

D. All metal parts and grounding conductors in each manhole or pullbox shall be grounded to a local ground rod.

E. Resistance – Readings shall not be taken within 48 hours of a rainfall.

F. The CONTRACTOR shall provide a written report for all grounding test results to the ENGINEER. The test shall include all ground connections. The report shall be signed by the OWNER of the contracting firm and shall include: test date, time, weather conditions on test date, weather conditions 3 days prior to the test date, location, and results.

G. All raceways require grounding conductors; metallic raceways are not adequate grounding paths. Bonding conductors through the raceway systems shall be continuous from main switch ground buses to panel ground bars of panelboards, and from panel grounding bars of panelboards, and motor control centers to branch circuit outlets, motors, lights, etc. These ground conductors are required throughout the project regardless of whether conduit runs or the Cable and Conduit Schedule show ground conductors on the Drawings.

H. All connections made below grade shall be of the exothermic type.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION

A. General

1. Nylon pull cords shall be installed in all empty conduits. Wire shall not be installed until all work of any nature that may cause damage is completed, including pouring of concrete. Mechanical means shall not be used in pulling in wires 8 AWG or smaller.

2. The use of running threads is prohibited and where some such device is necessary, split couplings, Erickson couplings, or equal shall be used. Where water-tight conduit installations are required, water-tight conduit unions shall be used.

3. All conduits shall be cleaned by pulling a brush swab through before installing cables.

4. All conduits shall be sealed at each end with electrical putty or Duct Seal. Special care shall be taken at all equipment where entrance of moisture could be detrimental to equipment.

B. Handling

1. Conduits subjected to rough handling or usage shall be removed from the premises.

2. Conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Care shall be given that plugs or caps are installed before pouring of concrete. All spare conduits shall remain plugged or capped upon project completion.

C. Concrete and Masonry

1. Where conduits pass through exterior concrete walls or fittings below grade, the entrances shall be made watertight. This shall be done by providing pipe sleeves in the concrete with 1/2" minimum clearance around the conduits, and caulking with askum and sealant, or by means of conduit entrance seals.

2. Where embedded conduits cross expansion joints, furnish and install offset expansion joints or sliding expansion joints. Sliding expansion joints shall be made with straps and clamps.

D. Panelboards and Boxes

1. Conduits entering panelboards, pull boxes, or outlet boxes shall be secured in place by galvanized locknuts and bushings, one locknut outside and one locknut inside of box with bushing on conduit end. The locknuts shall be

tightened against the box without deforming the box. Bushings shall be of the insulating type.

E. Bending

1. Field conduit bends shall be made with standard tools and equipment manufactured especially for conduit bending.

F. Mounting and Concealing

1. Conduit runs shall always be concealed in finished spaces and may be exposed in industrial spaces except where indicated on the Drawings.

2. Exposed runs of conduits shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of symmetrical bends or pull boxes as indicated on the Drawings. Bends and offsets shall be avoided where possible.

3. Where conduits are run individually, they shall be supported by approved pipe straps, secured by means of: 1) toggle bolts or hollow masonry; 2) expansion shields and machine screws or standard preset inserts on concrete or solid masonry; 3) machine screws or bolts on metal surfaces, and wood screws on wood construction. The use of perforated straps or wires will not be permitted.

4. Concrete inserts and pipe straps installed shall be stainless steel unless otherwise noted on the Drawings. All bolts, nuts, washers, and screws shall be stainless steel. Individual hangers, trapeze hanger, and rods shall be prime-coated and painted. Conduit support clamps shall be the two-piece type.

5. Conduit support struts, clamps, bolts, nuts and washers installed outdoors and in corrosive atmosphere indoors or on floors shall be stainless steel.

6. In furred ceilings, conduit runs shall be supported from structure, not furring.

3.2 TERMINATIONS AND SPLICES

A. Terminations of power cable shall be by means of U.L. approved connectors. All connectors shall meet U.L. 486B and shall be compatible with the conductor material.

B. Splicing of power, control, or instrumentation wiring will not be allowed except by written approval of the ENGINEER. Where splicing is allowed, splices shall be made waterproof regardless of location.

3.3 GROUNDING

A. General – Grounding shall be as indicated, and as required by NFPA 70 and ANSI-C2.

B. Grounding Connections – Grounding connections which are buried or otherwise normally inaccessible, and excepting specifically those connections for which access for periodic testing is required, shall be made by exothermic weld. Exothermic welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable. No mechanical connector is required at exothermic weldments.

C. Grounding Grid System – Conductors shall be buried a minimum of 24 inches in the ground. All cable crossings shall be securely bonded and the system connected to the ground system as well as to all equipment and structural steel work, and to all water piping.

D. Grounding Conductors – Conductors shall be insulated copper wire and sized as required by National Electrical Code.

3.4 FIELD TESTS

A. As an exception to requirements that may be stated elsewhere in the Contract, the ENGINEER shall be given five working days notice prior to each test. The CONTRACTOR shall demonstrate that all circuits and devices are in good operating conditions.

B. Test on 600 volt wiring – Verify all 600 volt wiring has no short circuits or accidental grounds. Perform insulation resistance tests on all wiring using an instrument which applies a voltage of approximately 500 volts to provide a direct reading of resistance. Minimum resistance shall be 1 megohm. The conductor loop resistance of each pair shall also be measured. The mutual capacitance between conductors of each pair shall also be measured. Provide written results for approval.

3.5 WIRE AND CABLE INSTALLATION

A. Conductors shall not be pulled into raceway until:

1. Raceway system has been inspected and approved by the ENGINEER.

2. Plastering and concrete have been completed in affected areas.

3. Raceway system has been freed of moisture and debris.

B. Conductors of No. 8 size and smaller shall be hand pulled. Larger conductors may be installed using power winches. Wire pulling lubricant, where needed, shall be

U.L. approved. Wire in panels, cabinets, and gutter shall be neatly grouped, using nylon tie straps, and fanned out to terminals.

C. Building wire conductors THHN / THWN installed below grade, or in concrete slabs on

grade, shall have type RHW-USE insulation, 600 volt. Building wire shall be stranded.

D. Each cable or wire in panels, pull boxes, manholes, or troughs shall have a permanent identification, with numbers and letters indicated on the conduit and cable schedule. For underground cable identification tag, see drawing.

E. Lubricants – Lubricants for assisting in the pulling of cables shall be those specifically recommended by the cable manufacturer. The lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings, and shall be U.L. approved. Use Polywater J or equal.

F. Cable Pulling Tensions – Shall not exceed the maximum pulling tension recommended by the cable manufacturer.

3.6 MOUNTING AND SUPPORTING ELECTRIC EQUIPMENT

A. Furnish and install all supports, hangers, and inserts required to mount fixtures, conduits, cables, pull boxes, and other equipment furnished under this section or furnished for installation under this section.

B. All items shall be supported from the structural portion of the building and studs, except standard ceiling-mounted lighting fixtures and small devices, that may be supported from ceiling system where permitted by the ENGINEER. However, no sagging of the ceiling will be permitted. Supports and hangers shall be of types approved by Underwriter's Laboratories.

C. Perforated straps and wire are not permitted for supporting electrical devices. Anchors shall be of approved types.

D. All supports, hangers, hardware, etc. used outdoors, shall be stainless steel and in corrosive atmosphere, or in hazardous areas shall be nonferrous, corrosion resistant, or stainless steel. Supports shall be selected to avoid galvanic reactions. Support devices shall be submitted for approval.

3.7 UNDERGROUND WORK

A. Excavation for Electrical Work

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. 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 conditions, or as indicated on the Drawings.

B. Coordination

The electrical contractor must check for existing utilities before commencing any

excavation or drilling. Contract Drawings and other trades are to be consulted to avoid interference with other utilities on this project. In the event of damage to existing utilities, the OWNER and ENGINEER shall be immediately notified, and the damage shall be immediately repaired at no cost to the Owner.

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. Materials for backfill shall be as specified in Specification 02222 – Excavation and Backfill for Utilities and Structures.

2. Locate and protect existing utilities and other underground work in a manner which will insure that no damage or service interruption will result from excavating and backfilling.

3. Protect property from damage which might result from excavating and backfilling.

4. Protect persons from injury at excavations, by shoring up, and using barricades, warnings and illumination.

5. Coordinate excavations with weather conditions, to minimize the possibility of washouts, settlements, and other damages and hazards.

6. Dewater excavations as necessary. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below grade property from being damaged by water, sediment, or erosion from or through the 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.

8. Except under roadways, backfill material shall be clean sand or shell rock. 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 using 8-inch high courses of backfill material, uniformly compacted to 95 percent density per ASTM Standard D1557, using power-driven, hand-operated compaction equipment. Watering the backfill for compaction is not an acceptable method.

11. Backfill to elevations matching adjacent grades. 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 passes through or occurs in a landscaped area, repair or replace the landscape work to match the original condition and quality of work.

13. Where excavation and backfill for electrical work passes through or occurs in an area of paving or flooring, replace and restore the construction and finish of the paving or flooring to match the original condition and quality of the work.

E. Underground

1. Underground conduits not under concrete slabs, shall be buried at least two feet below finished grade for circuits rated 600 volts or less, except under traffic areas, conduits shall be buried at least three feet below finished grade.

2. Where steel conduit penetrates ground or concrete, the conduit shall be painted with two coats of asphaltic base paint one foot on each side of penetration.

3. Transition from PVC to RGS shall be made prior to elbow below grade. Paint RGS with bitumastic, 12 inches above and below grade.

3.8 CONDUIT INSTALLATION

A. General – Conduits in structural slabs shall be placed between the upper and the lower layers of reinforcing steel, requiring careful bending of conduits. Conduits embedded in concrete slabs shall be spaced not less than eight inches on centers or as widely spaced as possible where they converge at panels or junction boxes. Conduits running parallel to slab supports, such as beams, columns and structural walls, shall be installed not less than 12 inches from such supporting elements. To prevent displacement during concrete pour, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured.

3.9 WIRE AND CABLE INSTALLATION

A. Installation of Cables in Manholes, Handholes, and Vaults. Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form all cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. In existing manholes, handholes and vaults where new ducts are to be terminated, or where new cables are to be installed, the existing installation of cables, cable supports, and grounding shall be modified as required for a neat and workmanlike installation, with all cables properly arranged and supported. Support cable splices in underground structures by racks on each side of the splice. If splicing is approved, locate splices to prevent cyclic bending in the spliced sheath and out of the water. Install cables at middle and bottom of cable racks, leaving top space opening for future cables, except as otherwise indicated. Provide one spare three- insulator rack arm for each cable rack in each underground structure.

B. Cable Markers (or tags) in Manholes and Handholes – Provide cable markers or tags for each cable or wire passing through or leaving manholes or handholes and at each terminal. Tags shall be stainless steel, bronze, lead strap, or copper strip, approximately 1/16 inch thick, or hard plastic 1/8 inch thick, suitable for immersion in salt water, and of sufficient length for imprinting the legend on one line, using raised letters not less than 1/4 inch in size, and shall be permanently marked or stamped with the identification as indicated. Use of two color laminated plastic is acceptable. Plastic markers shall be dark in color, and markings shall be light in color to provide contrast so that identification can be easily read. Fastening material shall be of a type that will not deteriorate when exposed to water with a high saline content.

C. All supports, hangers, hardware, etc. used outdoors, shall be stainless steel. In corrosive atmosphere, or in hazardous areas, shall be non-ferrous, corrosion resistant, or stainless steel. Supports shall be selected to avoid galvanic reactions. Support devices shall be submitted for approval.

D. Spare conduits shall be on top or accessible sides and identified uniquely at each location and active conduits shall be located on the bottom unless noted otherwise.

END OF SECTION

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SECTION 16110

RACEWAY AND BOXES

PART 1 - GENERAL

1.01 SCOPE

A. This Section includes basic materials and electrical methods for all of Division 16, Electrical and Related Work.

PART 2 - PRODUCTS

2.01 RACEWAYS AND FITTINGS

A. Liquid tight Flexible Nonmetallic Conduit shall be used for all connections to vibrating equipment, such as motors, valves, and devices on piping or ductwork. Liquid tight flexible nonmetallic conduit shall conform to NEC Article 356 as manufactured by Appleton, Robroy, or Anaconda. LTFNMC and fittings shall be as manufactured by Midwest or Robroy and shall be listed.

B. Rigid Nonmetallic Conduit – Polyvinyl chloride (PVC) conduit, boxes and fittings shall conform to NEMA TC-2 and to Military Specifications MIL-C-23571 for Type II, Schedule 80 unless noted otherwise.

C. Wireways and Auxiliary Gutters – Wireways and auxiliary gutters shall be galvanized steel with removable covers unless indicated as hinged. Components shall be as manufactured by Square 'D', Hoffman, Keystone, or General Electric. All wireways shall be without manufactured knockouts.

D. Galvanized Rigid Conduit (ANSI C80.0) – Rigid galvanized steel conduit "RGS" shall be U.L. Approved, Schedule 40, mild steel pipe, zinc-coated on the inside and outside. Fittings shall be zinc-coated, U.L. Approved.

2.02 BOXES AND ACCESSORIES

A. PVC Boxes and accessories shall conform to UL 498, with enclosure ratings NEMA 4, 4X, 12 and IEC IP66 as manufactured by Leviton Wetguard® or approved equal.

B. Concrete pull boxes shall be of the open bottom type, with an iron, locking cover marked "ELECTRIC" or "SIGNAL" as applicable, and shall be U.L. Listed and meet all codes.

PART 3 - EXECUTION

3.01 RACEWAYS

A. Use rigid, nonmetallic conduit as follows, unless noted otherwise: Grounding systems, utility systems, power and control systems throughout.

B. Use liquid tight, flexible nonmetallic conduit for all connections to vibrating equipment, such as motors, valves, and devices on piping or ductwork. The maximum length shall be restricted to 18" or less, any longer lengths must have approval. (A green bonding conductor is required in all runs, with other conductors.)

C. Install exposed conduit parallel with, or at right angles to the building lines. Conduit larger than 1", except as indicated, in reinforced concrete slabs shall be parallel with, or at right angles to the supports of the slab. Conduit in concrete shall be located so as not to affect the structural strength of the slabs. Conceal all conduits in walls, above ceilings, in or under slabs or in furring, except in mechanical and electrical rooms and as indicated. Exposed conduit shall be galvanized rigid conduit per section 16050 – Basic Electrical Materials and Methods.

D. Route feeders, home runs, and conduits where indicated, except those minor deviations as approved, will be permitted.

3.02 BOXES AND ACCESSORIES

A. Minimum size outlet box shall be 4" square by 1-1/2" deep unless otherwise approved or indicated otherwise.

B. Use non-metallic FD boxes constructed of rigid PVC as manufactured by Leviton Wetguard throughout.

3.03 MISCELLANEOUS

A. Provide Jet Line #232 in all empty conduits.

END OF SECTION

SECTION 16120

CONDUCTORS

PART 1 - GENERAL

This Section includes basic materials and methods for all of Division 16, Electrical and Related Work.

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Signal Conductors

1.2 APPLICABLE REQUIREMENTS

NEC Article 310 and 400 F.S.J-C-30

F.S.W-S-6106

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Conductors shall conform to Federal Specification J-C-30 for 600 volt, Types THWN/THHN, or XHHW stranded or as shown on the drawings. Sizes are AWG unless otherwise noted.

B. Grounding conductors larger than Size 1 AWG shall be soft drawn, bare copper or insulated copper. Control conductors for 100 to 600 volt shall be size 14 AWG copper, stranded, and color coded unless indicated otherwise.

C. Control conductors for 50 volt and under shall be plastic jacketed thermostat cable, Size 18 AWG single conductor, copper, multi-conductor as required. Fixture wire shall be Type THHN for all through wiring where permitted.

2.2 SPLICES AND TERMINATIONS

A. Connections shall comply with Federal Specification W-S-610b. Connectors for temperatures to 105NC shall be Ideal Wing Nut or 3M-Scotchloc.

B. Tape shall be Scotch 33 or slip-knot grey. Voids shall be filled with rubber tape or Scotchfill.

C. Terminal boards shall be General Electric, Type CR151, type A2. Lugs for the terminal boards shall be the locking tongue type. Control terminals and motor connections up to size 3 shall be ring tongue type as manufactured by T&B Sta-Kon.

D. Heat shrink for all splices outdoors. Insulating and sealing of all in-line, cable splices

from 16 AWG through 1000 kcmil shall be done in accordance with the instructions provided with the Shrink-Kon heat shrinkable insulators, catalog series HS as manufactured by Thomas & Betts.

E. The connector insulator must be made of thermally stabilized, homogeneous polyolefin having internally applied sealant. It must have Underwriter's Listing (UL48, 90NC, 600V) and be approved for the use. It must be usable without additional covering or adhesive, both indoors and outdoors, in overhead, direct buried, or submersed applications at rated voltage. It must not be adversely affected by moisture, ozone, oils, fuels, mild acids and alkalis, or ultraviolet light. It must be compatible with all commonly used cable jacket materials including rubber, plastic, lead, steel, aluminum, and copper. All conductors larger than #10 shall have Noalox Non-Corrosive Paste applied to wires' ends and terminals before connections are made. This will prevent or retard corrosion.

PART 3 - EXECUTION

3.1 CONDUCTORS

A. Conductors size 10 AWG and smaller shall be copper and have insulation colored for phases A, B, and N respectively as follows for single phase systems: 120/240 volts, black, red, and white.

B. All-bonding conductors shall have a green covering and shall be the same size as the circuit conductors unless otherwise indicated.

C. Installation of conductors shall be made only in completed raceway systems and all conductors in any conduit shall be pulled in together.

D. Use wire pulling compounds or lubricants as listed by Underwriters' Laboratories or talc, graphite, or soapstone.

3.2 SPLICES AND TERMINATIONS

A. Use solder-less terminal lugs on all standard conductors. Use approved solder-less connectors for all splices. Keep splices to a minimum.

B. Splice all neutrals prior to connection to wiring devices. Splices other than pre-insulated connectors shall be covered neatly with insulation type equivalent in value to the conductor insulation. Use minimum of 2 layers of tape.

3.3 PHASING AND IDENTIFICATION

A. The phase designation of all secondary conductors shall be the same and shall be indicated in or on all 3-phase outlets, transformers, panelboards, and disconnect switches, and they shall be connected with uniform phase sequence.

B. Control wiring shall have a Brady® label or equal attached, secured with a clear piece of heat shrink tubing over the numbers. The numbers shall be attached 1 inch

from each end. Tag each individual conductor or wire with a label stating the terminal designation indicated on schematic diagrams, or given on manufacturer's equipment lists, and at each terminal strip, relay, etc.

3.4 NUMBER OF CONDUCTORS

A. For convenience and simplicity, wire tics are shown only on home runs other than power circuits. The Contractor shall determine the correct combination of wires to be run in all raceways including home runs, branch circuit wiring and switch legs.

B. A green ground wire must be included in all conduits. Neutral wires shall be determined by the load and proper phasing on multi-wire branch circuits.

C. All conductors shall have identification per NEC and local codes.

1. Colored tape for feeder conductors should be secured on the conductor with clear piece of heat shrink tubing.

D. Conduit fill shall be sized per National Electric Code. All 120 volt circuits shall each have individual neutrals.

3.5 TESTING

A. After wiring has been pulled in raceways and before hook-up, wires shall be subject to an insulation test. A Megohmeter of 500 volts shall be used, and a minimum of 10 megohms will be acceptable. Test shall be witnessed by the ENGINEER. A 48-hour notification must be given before test(s) commence. It is typical that wire was abused during installation, usually due to lack of lubrication. The test will reveal any damage to insulation on wiring.

END OF SECTION

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SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

Basic Materials & Methods

1.02 APPLICABLE DOCUMENTS

NEMA WD-1 – Wiring Devices, Non-locking
NEMA WD-5 – Wiring Devices, locking type
F.S. W-S-896c – Toggle Switch
F.S. W-P-455a – Wall Plates

PART 2 - PRODUCTS

2.01 RECEPTACLES

A. All receptacles shall be the grounding type and shall conform to applicable portions of NEMA Standards WD-1 and WD-5.

NEMA Configuration - #5-20, duplex, Ivory
P & S #5342-I
Leviton - #5342-I
NEMA Configuration #1050
Hubbell - 7512-G receptacle
Hubbell - 7118 stainless steel plate
Hubbell - 7914 cord set (length as required)

2.02 PLATES AND COVERS

A. Wall plates for recessed devices shall conform to Federal Specification W-P-455a and shall be of Ivory color with matching screws unless indicated otherwise, and of the configuration required for the devices installed.

Leviton - 86000 Line, P & S or equal
Surface (raised) covers for 4" square boxes shall be 1/2" deep.
Surface covers shall be as manufactured by Steel City, Appleton or Raco of the configuration required. Cover plates indicated (WP) weatherproof shall be made of Type 302 stainless steel with stainless steel springs, screws and gaskets. Sierra Series "WP" of the configuration required.

2.03 ATTACHMENT CAPS AND CONNECTORS

A. Caps shall be NEMA Standard mates to the receptacles and connectors used and shall be as manufactured by Hubbell. Provide one cap for each receptacle other than the duplex type.

B. Electrical contractor shall connect all equipment furnished by Owner or other contractors, including caps and cords and materials required to complete the installation.

PART 3 - EXECUTION

3.01 INSTALL PLATES AND COVERS ON ALL OUTLETS. INSTALL ALL DEVICES UNIFORMLY IN EACH AREA. USE 20 AMPERE SWITCHES AND RECEPTACLES EVERYWHERE.

3.02 INSTALL A CORD AND CAP (PLUG) ON ALL EQUIPMENT INDICTED "C & P" ON THE SCHEDULES. CONNECT THE TOP HALF OF SPLIT RECEPTACLES HOT AND USE THE BOTTOM AS THE SWITCHED SECTION. TEST EACH SOCKET OF EACH OUTLET WITH A DEVICE INTENDED FOR THIS PURPOSE. GANG SWITCHES AND DIMMERS WHERE FEASIBLE.

3.03 MOUNTING HEIGHTS (TO CENTER LINE OF BOX):

A. Generally mount outlets 36" up unless noted.

B. Mount switches and dimmers at 48" up.

C. Mount outlets over mirrors 8" higher than mirror.

D. Mount outlets over counters and centered in the back splash where it occurs.

E. Adjust outlet heights in ceramic tile walls to be entirely in or entirely out of the tile.

F. Outlets may be horizontal to meet space conditions.

G. Mount exhaust fan thermostats 2' from ceiling and bypass switch 48" from finished floor.

END OF SECTION

SECTION 16151

VARIABLE FREQUENCY DRIVE UNIT

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide complete simplex type variable frequency drive (VFD) units and appurtenances including drive reactors, DC chokes, harmonic filters, enclosures, and certain auxiliary items, as indicated and as specified, to provide a complete operating system.

B. Variable frequency drive unit shall be furnished, installed and electrically connected by the electrical subcontractor.

C. VFD units shall be manufacturer's standard technology and in production for a minimum of 2 years.

D. Provide control system operation, input and control signals, status signals and devices in accordance with Division 13. The VFD shall be capable of communicating (for both remote monitoring and control functions) via Ethernet IP Protocol. Most external analog and discrete Inputs/Outputs (I/O) will be communicated using this protocol. Refer to the electrical schematics in the drawings for all required VFD I/O.

E. Provide Underwriter's Laboratories listed drive components where applicable.

F. Provide VFD output reactor when cable length between VFD and motor is greater than 50 feet and less than 150 feet to insure motor terminals do not experience overvoltage condition. Provide output dV/dT filter when cable length between VFD and motor is greater than 150 feet.

G. VFD's shall meet all requirements as outlined in the latest edition of IEEE 519 for each individual and total harmonic voltage distortion and as indicated in this specification. As per Table 10.2 of IEEE 519, individual or simultaneous operation of the VFD's shall not add more than 5% total harmonic voltage distortion while operating at full load and speed from the utility source.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 16220: Motors

1.03 REFERENCES:

A. Underwriter's Laboratories Inc. (U.L.):

1. UL-508 Electrical Industrial Control Equipment.

B. National Electrical Manufacturers Association (NEMA): MG 1.

C. National Fire Protection Association (NFPA):

1. NFPA-70 National Electric Code.

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01340 – Shop Drawings and Submittals:

1. Shop Drawings: Provide a complete list of equipment components, and materials, including manufacturer's descriptive and technical literature, and catalog cuts. Provide complete wiring, system interconnection and schematic diagrams for the equipment and controls furnished including external interlocked and controlled components, equipment layout, time versus current curves for protective devices and any other details required to demonstrate that the system and the required external controls has been coordinated and will properly function as designed.

a. Provide data to verify that drives can be used for motor lead lengths up to 100 feet without output filters. Include information from the VFD manufacturer or output filter or reactor manufacturer (if required) stating that the motor terminal voltage limitations as defined by NEMA Standard MG-1, section 31.40.4.2, are met. For VFD's located more than a cable length of 100 feet from the motor load provide output filter or reactor at VFD.

b. Provide enclosure drawings and details showing all dimensions and construction details.

2. Submit information relative to location and expertise of local service office and personnel.

3. For informational purposes only, submit manufacturer's printed installation instructions.

4. Spare Parts Data: Submit a list of spare parts for the equipment specified.

5. Operating and Maintenance Instruction Manuals:

a. Furnish:

(1) Operating instruction manuals outlining step-by-step procedures required for system startup and operation.

(2) Manufacturer's name, model number, service manual parts list.

(3) Brief description of equipment and basic operating features.

(4) Maintenance instruction manuals outlining maintenance procedures.

(5) Troubleshooting guide listing possible breakdown and repairs.

(6) Point-to-point connection wiring diagram for the system.

(7) Performance Test Reports: Upon completion of installed system, submit in booklet form all shop and field tests performed to prove compliance with specified performance criteria.

1.05 QUALITY ASSURANCE:

A. Ensure that conduit size and wire quantity, size, and type are suitable for the equipment supplied. Coordinate all design information with the Electrical Contractor. Review the proper installation of each type of VFD unit with the equipment supplier prior to installation.

1. Services of Service Engineer, specifically trained on type of equipment specified. Man-day requirements listed exclusive of travel time.

a. Assist in location of devices, methods of mounting, field erection, etc.

1 man-day.

b. Start-up and testing.

3 man-day.

c. At the end of start-up service provide for a maximum of six members of the owners staff at the facility site to receive training from the startup/testing service Engineer.

1 man-day.

d. Service-inspections during first year of operation, for use at Owner's request, and exclusive of repair, malfunction or other trouble-shooting service calls:

2 man-day.

e. Man-day is defined as one 8-hour day, excluding travel time.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Shipping:

1. Ship equipment and materials, except where partial disassembly is required by transportation regulations or for protection, complete with identification and quantity of items.

2. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

3. Deliver spare parts after installation but as specified before start-up of drives. Deliver to Owner after completion of work.

B. Storage:

1. Inspect and inventory items upon delivery to site.

2. Store and safeguard equipment, material and spare parts.

1.07 WARRANTY AND SERVICE:

A. Provide in accordance with Section 01740 and as specified.

B. Guarantee components, parts, and assemblies supplied by manufacturer against defects in materials and workmanship for a period of 24 months after turning the equipment over to the Owner, and in this time period include onsite, parts and labor warranty. All labor to be performed by local factory trained service engineers.

C. Ensure that equipment manufacturer has local branch office staff with trained, full-time employees who are capable of performing testing, inspecting, repair, and maintenance services.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Manufacturer shall have at least five years commercial experience in the manufacture, operation and servicing of equipment of type, size, quality, performance, and reliability equal to that specified.

B. Variable Frequency Drive Units:

1. Allen Bradley.

2. No substitutions permitted.

C. VFD Input Filters and Output Filters/Reactors:

1. Trans-Coil, Inc.

2. MTE Corporation.

3. Power Quality International.

4. Or acceptable equivalent product.

2.02 PROVISIONS:

A. Service Conditions:

1. Ambient Temperature Range: 0 deg. C to 40 deg. C.

2. Operational Humidity: Up to 90 percent non-condensing.

3. Environment: Mounted inside NEMA 4X control panel enclosure.

4. Altitude: Below 3,300 ft. above sea level.

5. Input Power:

a. Nominal voltage - 240 volts (plus 10 percent or minus 10 percent), 1-phase, 3 wire.

b. Nominal Frequency - 60 Hertz (plus or minus 2 Hz.)

c. Service provided from feeder breaker on distribution bus.

B. Drive System: 0-500 HP Units

1. General:

a. Furnish solid state variable frequency, microprocessor type with Pulse Width Modulated (PWM) output wave form converter. The VFD shall employ a full wave rectifier to prevent input line notching, a DC bus choke, DC bus capacitors and Insulated Gate Bipolar Transistors (IGBT) as the output switching device to convert nominal 240 volts, 1 phase, 60 Hertz, 3 wire input power into 3 wire system at 0 to 240 volts, 3 phase, 0 to 60 Hertz output power.

b. Motor control circuits shall be wired in accordance with the requirements specified herein or indicated on the Drawings. Where not indicated, the control circuits shall be standard two-wire “start-stop” and the Contractor shall furnish wiring accordingly.

c. Variable frequency drive manufacturer shall be responsible for the successful application and operation of the entire drive and control system serving the motor and driven equipment. This includes the responsibility for obtaining loads, torque, speed and performance requirements from the respective sources and integrating these into a variable frequency drive system that fulfills the requirements of this Specification.

d. The Contractor and variable frequency drive system manufacturer shall review and ensure compliance with the total Contract Documents. Typical examples of items that should be reviewed are circuit breakers, motor circuit protectors, magnetic starters, relays, timers, control and instrumentation products, pilot devices including pushbuttons, selector switches and pilot lights, enclosures, conduit, disconnect switches, terminal boxes, and other equipment.

e. Provide flux vector control type drives, also known as field-oriented control, with hard-wired motor speed feedback encoder or tachometer, for full torque at zero speed capability.

f. Provide VFD control which ensures accurate zero to full load torque control at low frequencies, including zero speed, with torque repeatability accuracy of 2% or better and torque response time less than 20 ms.

g. Provide on drive, a disconnecting device and fixed diode input rectifier (for a constant power factor).

h. For units rated 50 Hp or less, provide 6 pulse drives with 5% impedance input line reactor.

i. All components of the drive shall be designed and sized for the abnormal condition of continuous operation of the driven equipment specified herein at loads up to 15% above rated full load.

j. RMS harmonic output of the drive not to provide more than 5 percent increase in motor heating over similar operation of the motor with zero harmonics in the current.

k. The unit shall withstand drive output terminal line-to-line and line-to-ground short circuits without component failure during start-up and during operation. Drive to safely shutdown until short is cleared.

l. NEMA type cabinet for each drive unit, as indicated on drawings and enclosure schedule.

m. For inverter rated squirrel cage motors, per NEMA Standard MG-1, part 31.40.4.2, the following limit values at the motor terminals are to be observed:

(1) For motors with base rating voltage less than or equal to 600 volts, the peak instantaneous voltage must be limited to 1600 volts or less, with a voltage rise time greater than or equal to 0.1 micro-seconds.

n. The VFD manufacturer shall guarantee that the above voltage limits will be met. If the VFD manufacturer is not able to guarantee that the above voltage limits will be met, provide a drive output filter or reactor, appropriately rated, located within the enclosure and near the VFD output terminals, which shall ensure that the limitations listed above are maintained. A device located at the motor terminals is not acceptable.

o. The drive unit shall be of modular design to provide for ease and speed of maintenance.

p. Control circuits shall be isolated from power circuits.

q. Provide trap filters for the drive unit to meet the requirements of the harmonic study under paragraph 2.02. Filters shall be provided with contractors and controlled by the VFD to remove them from the line when the drive is not operating. Contractors shall be provided with spare contacts for remote alarm and to energize status lamp at VFD enclosure.

r. VFD shall be capable of full rated output when powered by incoming voltage with Total Harmonic Distortion (THD) in excess of 10%.

s. Furnish series choke and capacitors on dc bus to reduce ripple in rectifier output and to reduce harmonic distortion reflected into incoming power feeders.

t. NEMA 1 type enclosures to have keypad controls located on exterior of enclosure.

2. Performance characteristics:

a. Output amps: 110 percent of rated, continuous.

b. Current limit: Range 0 to 130% for constant torque applications, 0 to 110% for variable torque applications, for 1 minute minimum.

c. Acceleration time to top speed, 1-300 seconds, minimum, adjustable.

d. Deceleration time from top speed, 1-300 seconds, minimum, adjustable.

e. Frequency stability: +/- 0.5% (at 25 degrees C, +/10 degrees C) after reaching operating temperature.

f. Output voltage: Proportional to frequency with low speed boost.

g. Combined drive/and filtering efficiency, defined as motor shaft KW divided by VFD input KW, shall meet the following minimum requirements at the specified operating points:

(1) 96 percent at 60 Hz VFD output and 100 percent load.

(2) 94 percent at 50 Hz VFD output and 60 percent load.

h. VFD fundamental power factor shall be 0.98 or higher at all speeds and loads.

i. The VFD shall be capable of sustaining continued operation with a 30% dip in nominal line voltage. Output speed may decline only if current limit rating of the VFD is exceeded.

j. Losses to be utilized in drive system efficiency calculation shall include the input isolation transformer, harmonic filter and power factor correction if applicable. Auxiliary controls such as internal VFD control boards and cooling fans shall be included in all loss calculations.

3. Drive Protection:

a. General :

(1) Fault detection and trip circuits shall protect VFD and connected motor against line voltage transients, single-phase, power line overvoltage and undervoltage, output overvoltage and overcurrent, and VFD overtemperature. The VFD shall employ three (3) current limit circuits to provide trip free operation. The slow current regulation limit circuit shall be adjustable to a minimum 125% of the

VFD's variable torque current rating. The rapid current regulation limit shall be adjustable to a minimum 170% of the VFD's variable torque current rating. The current switch off limit shall be fixed at a minimum 225% of the VFD's variable torque current rating.

b. Internal Protection: Minimum circuitry as follows:

(1) Current limiting, fast acting, semiconductor input fuses for protection of internal power semiconductors.

(2) Instantaneous output overcurrent trip max. - 200 percent.

(3) DC bus and control circuit transformer fusing.

(4) Grounded control chassis.

(5) Under and over voltage trip, 3 phases.

(6) Motor overload protection, with solid state relays.

(7) Fault reset push button.

(8) Line to ground faults.

(9) Input metal oxide varistor and input line reactor for transient protection.

(10) VFD over temperature.

c. Troubleshooting: Diagnostic aids to indicate cause of fault; used to assist in troubleshooting circuit problems. Isolated Form C contacts for remote indication of alarms to include the following:

(1) Over/under voltage indication.

(2) Overcurrent trip indication.

(3) DC bus charged indication.

(4) Fault detection indication.

(5) Recycle start indication (to indicate that the unit tried to pick up load for three previous tries and failed).

d. Provide power loss ride through capability which will allow the logic to maintain control due to load inertia without faulting.

e. Provide a programmable automatic restart function which will provide a minimum with time delays between restarts of 3 restarts following a fault condition other than a

ground fault, short circuit, internal fault, or user programmable fault condition. Restart type to be programmable for time delay or coasting motor restart.

C. Auxiliary Systems:

1. Provide variable frequency drive unit with appropriate power circuitry and auxiliary contacts for energizing and controlling the following devices associated with the motor, if required:

a. Space heaters

b. Solenoid valves

c. Remote indication of motor start and stop (isolated contacts)

D. Minimum Control Features:

1. LOCAL-REMOTE selection of Start/Stop control.

2. Provide Ethernet TCP/IP communication module

E. Devices:

1. Provide operating, monitoring or alarm indicating devices, on keypad, with minimum as follows:

a. System control selector switch (RUN/OFF/REMOTE) (When in RUN position drive will run).

b. Run time meter.

c. Alarm and status lights.

2.03 SHOP TESTING (18 pulse units only)(NOT USED)

2.04 SPARE PARTS

A. Provide in accordance with Section 01730 and as specified.

B. Provide one spare board or card, three diodes, for each horsepower size drive. Spares will be color-coded or otherwise keyed to their original counterpart such that improper installation of spare cards is impossible. In addition to the cards, the manufacturer shall provide three spares for all expendable items such as pilot lamps, power fuses, and control fuses. Provide one keypad for every three VFD of the same model.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine VFD location for satisfactory preparation. Check conduits and raceway location for connection to units.

B. Visually inspect delivered unit(s) and accessories for conformance with specification and drawings.

C. Verify availability of appropriate pacing signal.

D. Maintain variable frequency drive in upright position at all times.

E. Protect variable frequency drive against damage. Store drive in clean, dry environment with temperature and humidity within range as specified by drive manufacturer. Energize space heaters during storage as recommended by manufacturer.

3.02 INSTALLATION

A. Erect, install, and start-up equipment.

B. The VFD's shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.

3.03 Factory-trained service personnel, other than sales representatives, shall supervise field installation, inspect, make final adjustments and operational checks, make functional checks of spare parts, and prepare a final report for record purposes. Adjust control and instrument equipment until this equipment has been field tested.

3.04 FIELD TESTING

A. Provide in accordance with Section 01650.

B. Perform testing checkout, and start-up for variable frequency drive equipment under technical direction of manufacturer's service engineer. Under no circumstances energize any portion of the drive system without authorization from manufacturer's technical representative.

C. Field Tests:

2. Test each drive over the total speed range that it will be required to operate through for the load being driven for a minimum of two hours. Determine for each drive, motor, and load combination the following:

a. Input power (kW), voltage, current and RMS power factor on the line side of the drive isolation device.

b. Output to the driven load in kilowatts.

c. For each drive, measure the harmonic voltage distortion and harmonic current distortion for each harmonic at the main distribution bus for maximum and minimum load conditions.

d. Measure the total harmonic voltage distortion and total harmonic current distortion at each PCC for maximum and minimum load conditions.

3. Test each drive by using the actual control signal for remote and local operation.

4. Test each driver's alarm functions.

5. Perform all tests in the presence of the Owner's representative.

6. Perform the above test in addition to the manufacturer's normal field tests.

7. Submit final test report with summary comparing field test data with harmonic analysis design calculated values for each drive.

3.05 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 16180

SAFETY SWITCHES, CIRCUIT BREAKERS, AND SWITCHES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

Panelboards – Section 16160

Applicable Documents:

NEMA AB-1 – Molded Case Circuit Breakers
NEMA IC-1 – Industrial Control
F.S. W-S-865c – Enclosed Switches
F.S. W-C-375a – Circuit
Breakers U.L.-198 – Fuses
NEMA FU-1 – Fuses

1.02 SUBMITTALS

Submit Shop Drawings for review including catalog cuts showing sizes, types, and characteristics of all products.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES/CIRCUIT BREAKER DISCONNECTS

A. Safety switches shall conform to Federal Specifications W-S-865c, heavy duty type HD, fusible or non-fusible, with the poles, ampere, voltage, and horsepower ratings indicated and shall have solid neutrals and Class R clips. Lugs shall be U.L. listed for copper-aluminum.

B. Enclosures for safety switches shall be NEMA 4X.

C. Switches and disconnects shall be as manufactured by Square 'D', General Electric, Siemens, or Eaton.

D. Circuit breaker disconnects may be used in lieu of safety switches providing they comply with the safety switch requirements and are applied within their ratings and a schedule is submitted for approval.

2.02 CIRCUIT BREAKERS, MOLDED CASE

A. Circuit breakers shall conform to Fed. Spec. W-C-375a and NEMA Standard AB-1 unless indicated otherwise. Circuit breakers shall be of the ampere rating, voltage rating, number of poles and class or interrupting capacity (I.C.) as indicated. Interrupting ratings are given in root mean square (RMS), symmetrical amperes based on NEMA test procedures. Lugs and terminals shall be U.L. listed for copper-aluminum. Accessories shall be 120 volt.

B. Each circuit breaker shall have a trip unit for each pole with elements providing inverse time delay under overload conditions and instantaneous magnetic trip for short circuit protection unless indicated as non automatic. Trip elements shall operate a common trip bar to open all elements.

2.03 FUSES

A. Provide rejection fuses for all fusible equipment regardless of which section has furnished such equipment.

B. Fuses shall be of the ratings shown on the drawings, U.L. listed and shall be Bussman Manufacturing Co., Gould-Shawmut Company, CEFCO or approved equal.

C. All fuses shall be current limiting and have an interrupting capacity of at least 200,000 amperes RMS symmetrical.

D. The time-current characteristics and ratings shall be such that positive selective coordination is assured.

E. Fuses, 600 amperes and lower, where applied to general feeder and branch circuit protection, shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN- RK-SP LPS-RK-SP, "Low Peak". Gould-Shawmut dual element "Amp-Trap."

F. Fuses, where required for circuit breaker protection shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP or LPS-RK-SP "Low Peak", or Gould-Shawmut Class RK1 "Amp-Trap."

G. Coordination and current limitations or the protection of each part of the electrical system must be designed around the type and class and manufacturer selected for that type and class.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mount grouped switches, disconnects and controls on backboards or unistrut. Provide labels on or in all fusible equipment indicating the type and size replacement fuse required.

B. Generally, mount switches and disconnects between 4' and 5' A.F.F., readily accessible.

3.02 FUSES

A. Install all fuses as required where indicated on the drawings and where required by the National Electrical Code, special attention shall be given to air conditioning equipment.

B. Provide 10% spares (minimum of three) of each size and type of fuses furnished. Spare fuses shall be placed in a wall mounted cabinet equal to: Bussmann SFC which shall be located in the switchgear room.

END OF SECTION

SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

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. Section includes equipment identification labels.

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.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, 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.

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.

PART 2 - PRODUCTS

2.1 UNDERGROUND-LINE WARNING TAPE

A. Tape

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical, controls and I&C raceways.

2. Printing on tape shall be permanent and shall not be damaged by burial operations.

3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing

1. Comply with ANSI Z535.1 through ANSI Z 535.5.

2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, LOW VOLTAGE.

3. Inscriptions for Orange-Colored Tapes: I&C CABLE, OPTICAL FIBER CABLE.

2.2 EQUIPMENT IDENTIFICATION LABELS

A. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identification 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.

C. Apply identification devices to services 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. 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 overall.

3.2 IDENTIFICATION SCHEDULE

A. Locations of Underground Lines – Identify with underground-line warning tape for electrical, controls and I&C wiring and optical fiber cable.

B. Equipment Identification Labels – On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the 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 requiring labels include power, lighting, control, and I&C unless equipment is provided with its own identification.

1. Labeling Instructions

a. Indoor Equipment – Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of

text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high. Utilize white lettering on black background.

b. Outdoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high. Utilize white lettering on black background.

2. Equipment to Be Labeled

a. Enclosures and electrical cabinets

b. Motor Control Centers

c. Enclosed switches

d. Variable Frequency Drives

e. Monitoring and control equipment

END OF SECTION

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SECTION 16220

MOTORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section applies, in general, to all electric or DC motor-driven equipment provided under Divisions 2 through 16 Sections. This Section shall supplement the detailed Equipment Specifications, but in cases of conflict, the Specifications indicated in this Section shall govern.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Submittals for motors shall accompany the specific equipment the motor is to be supplied with.

2. Submit product literature for each motor.

B. Operation and Maintenance Manuals: Submit in accordance with requirements of this section. Provide complete operation and maintenance manuals for items included under this Section.

C. Warranty: Submit warranties covering the items included under this Section.

1. Warranty time periods shall start from Start-up date and not ship dates.

2. Pump warranty shall not be affected by the inclusion of existing control panel, or provision of new control panel by owner.

1.03 QUALITY ASSURANCE

A. Electrical Codes, Ordinances, and Industrial Standards: The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment, and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable State and local requirements. UL listing and labeling shall be adhered to under this Contract. Any equipment that does not have a UL, FM, CSA, or other listed testing laboratory label, shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electrical Code and OSHA requirements. Any additional cost resulting from any deviation from codes or local requirements shall be borne by CONTRACTOR.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, motors shall be standard design and construction. Manufacturers offering products which may be incorporated in Work include:

1. Motors:

a. Xylem.
b. Homa.

B. For motors that are integrally constructed as a piece of equipment, such as appliances, hand tools, etc., and where manufacturer would be required to redesign equipment to meet these general specifications, it is the intent to allow such standard motors to be used, provided they do not exceed 1-1/2 horsepower and are suitable for use on standard power systems.

2.02 MATERIALS

A. Shop primers shall be Tnemec "77 Chem-Prime," or equal.

B. Rust preventive compound shall be equal to Dearborn Chemical "No-Ox-ID2W," Houghton "Rust Veto 344," or Rust-Oleum "R-9".

2.03 MANUFACTURED UNITS

A. Electrical Motors: Motor design and application shall comply with current ANSI, IEEE, NEMA, and AFBMA standards and with the NEC where applicable. They shall be squirrel cage induction motors rated 60 hertz, continuous duty for use in 40 degrees C ambient temperature. Motors shall comply with NEMA MG1-1993, Rev. 1, Part 31, Definite Purpose Inverter-Fed Motors whether used with variable frequency drives or not.

1. The motors shall be sized within their rated loads under the specified conditions without utilizing the top 15 percent of the 1.0 or 1.15 service factor. Motor sizing measured at the motor output shaft shall include all loadings on the motor. Motor loadings shall include the maximum or specified load condition of the driven equipment plus all drive losses of components, located between the motor and the driven equipment.

2. The motor winding temperature rise shall be NEMA Standard for the class of insulation used at the rated service factor load.

3. The motors shall be capable of handling unfiltered voltage peaks of up to 1600 volts, and rise times of 0.1 micro-seconds.

B. All integral horsepower motors shall have oversize conduit boxes with clamp-type grounding terminals inside which are effectively connected to all noncurrent-carrying motor parts.

C. Multispeed motors are to be supplied with separate windings for each speed. The cost to change starters for motors supplied with reconnectable windings will be the responsibility of equipment (motor) supplier and must be coordinated with ENGINEER.

D. All explosion-proof motors shall meet NEC Class 1, Division I, Group D, requirements with T2A temperature rating.

E. Unless these general specifications are supplanted by the detailed equipment specifications, motors shall be rated and constructed as follows:

1. From 2 to 200 Horsepower: Motors shall be rated 230/460 or 460 volt, 3-phase. They shall be grease lubricated, ball bearing, Class B insulated, minimum or as specified. Horizontal motors shall be open drip-proof, totally enclosed fan-cooled or totally enclosed explosion-proof (NEC, Class I, Group D) as shown on Equipment Schedule(s) or specified in the equipment specifications. Vertical motors shall meet NEMA standard open drip-proof specifications as a vertical motor when called for or totally enclosed fan cooled or totally enclosed explosion-proof as shown on Equipment Schedule(s).

F. Horizontal and vertical motors may also be weather protected, Type I, and shall have encapsulated or sealed windings.

G. Open drip-proof type motors shall have encapsulated or sealed windings when called for on Drawings or Equipment Schedules.

H. Special duty and severe environment application shall have motors which are designed specifically to meet the special conditions as specified.

I. The following symbols will be employed on Equipment Schedule(s) to indicate the required motor enclosure and construction features:

1. TE Totally Enclosed, may be nonventilated, fan-cooled or air-over type.

2. TENV Totally Enclosed Nonventilated.

3. TEFC Totally Enclosed Fan-cooled.

4. TEEP Totally Enclosed Explosion-proof, Class I, Div. I, Group D.

5. ODP Open Drip-proof.

6. WPI Weather Protected Type I.

7. E/S Encapsulated or Sealed Windings.

a. All motors with encapsulation or sealed windings shall have a water-tight conduit box.

J. See NEMA Standard MG1 for definition of above terms.

K. Motor Efficiency: Where Equipment Schedule(s) indicate that motors shall be designed for high efficiency, they shall meet or exceed the Motor Operating Characteristics shown on High Efficiency Motor Schedule No. 16220.2, appended to this Section. Guaranteed minimum efficiency at full load shall be based on IEEE Standard 112, Test Method B. Nominal motor efficiencies are average expected values. Manufacturer's motor Shop Drawings shall indicate full compliance with the High Efficiency Motor Schedule No. 16220.2.

L. Vertical Motors: The motors shall be induction motors designed for operation on a 3-phase, 60 hertz power system at the voltage indicated on Equipment Schedule(s). Motor housing shall be designed for vertical use and meet the NEMA specifications as a vertically oriented motor. The design, construction and performance characteristics of the motors shall conform to applicable provisions of the latest NEMA, IEEE, and ANSI Standards. They shall perform in accordance with their nameplate rating and be free of any defective material or workmanship.

1. The motors shall have a horsepower rating based on continuous operation (24 hours per day) at full load without exceeding 40 degrees C. The horsepower rating shall be adequate to operate the driven equipment under all normally expected operating conditions without overloading. Minimum full load efficiency shall be 92.5 percent and minimum full load power factor shall be 89 percent. Service factor shall be 1.0. Motor insulation shall be Class B or better. The motor temperature rise shall be NEMA standard for the class of insulation used for the rated service factor load. Motor shaft loading shall not exceed rated horsepower.

2. Motor manufacturer shall be responsible for obtaining the speed torque characteristics of the driven equipment. Speed-torque curves showing the torque characteristics of both the motor and the driven equipment on the same graph together with WK^2 of both the motor and the driven equipment shall be submitted to ENGINEER. This information is to be included with submittal of outline Drawing for approval.

3. Motors shall have passive temperature switches for use in the motor control circuit that will limit the winding temperature as defined by NEMA Standard MG1-12.53 Type 1. The contacts shall be normally open and rated to operate a switchgear control relay in either a 250 volt AC (40 VA) or 125 volt DC (12W) control circuit.

4. Coils shall be form wound, vacuum pressure impregnated and compactly shaped to fill the slots. Vacuum pressure impregnation shall be done by treating the entire stator with a minimum of 2 impregnations after the coils are placed in the slots. Winding and end connections shall be fully sealed against contaminants. The stator complete with winding shall be given additional dips and brakes. Motor end turns shall be adequately braced with nonshrinking material and shall withstand the stress caused by full voltage starting.

5. Motors shall have weather-protected Type I enclosures with top discharge air ventilation openings. Openings shall be equipped with easily removable guard screens. Motors shall have air inlet filters and space heaters.

6. Space heaters shall be 120 volt AC single phase in frame Sizes under 8600. Space heaters shall be 480 volt 3-phase in frame Sizes 8600 and larger. Motors with space heaters shall

include heater leads in a separate conduit box mounted on the motor frame. The conduit box shall have an access cover.

7. Motors shall have terminal boxes of adequate size for the construction of the stress cones on the incoming cable and any other connections such as surge and power factor correction capacitors and surge arrestors. Terminal leads shall be minimum of 12 inches long and shall be equipped without lugs. Terminal boxes for motor leads shall have the following minimum dimensions: 20-inch H, 15-inch W, 10-inch D. They shall be diagonally split and furnished undrilled for conduit. The boxes shall be gasketed and suitable for mounting in any direction without allowing water to enter. Each motor shall be equipped with a General Electric Co. or Westinghouse "Surge-Pac," or equal, overvoltage protection. A power factor correcting capacitor shall be provided for full load power factor correction of 0.96 minimum. The Surge-Pac and capacitor shall meet the Specifications of Division 16. The terminal box, Surge-Pac, and power factor correction caps shall be floor-mounted with all connections to the motor housing being made through flexible conduit.

8. Line and thrust bearing shall be of adequate size to take the load of the rotor, together with that of such parts of the shaft not carried by the driven machinery. A suitable base of high-grade cast iron shall be provided for mounting the motor. Adequate provisions must be made at the top of the motor for adjustments to the drive shaft. The motors shall have a protected head cover with a suitable lifting ring or rings.

9. Nameplates shall be metal and be installed with data as required by NEMA and also show locked rotor current and lead connection diagram.

10. The maximum overall noise level shall not exceed the level defined in the latest revision of NEMA Standard MG1-12.49 or MG1-20.49, whichever is applicable to the particular machine.

11. Certified routine shop tests shall be made on one motor out of each size group for motors 1,500 horsepower or smaller. Full running shop tests shall be made on each motor larger than 1,500 horsepower. Test results shall be submitted to ENGINEER for ENGINEER's record.

12. Provisions for mounting a vibration motor sensor on each motor shall be provided. The mountings for the vibration sensors shall consist of a threaded mounting hole 1/2-20 UNF 2B 0.400-inch minimum depth full threads. Hole shall be located perpendicular, within 0.010-inch/inch, to the centerline of a raised 2.0-inch diameter machined flat surface. Machined surface shall be flat within 0.005 inch. The machined surface is to be located on the upper part of the motor, as close top the thrust bearings as practical and between lifting lugs. The machined surface is to be oriented vertically and parallel plus or minus 3 degrees to the shaft centerline such that the threaded hole is horizontal and perpendicular to the shaft centerline within plus or minus 5 degrees.

2.04 FABRICATION

A. Electric motors shall be shop-finished with 2 coats of enamel paint per manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's written installation and alignment instructions.

B. Lubricate oil-lubricated bearings.

C. Provide electrical wiring and connections as specified in Division 16 Sections.

3.02 FIELD QUALITY CONTROL

A. Inspect all terminations for proper connection.

B. Check motor for proper rotation.

3.03 INSTALLATION CHECK

A. Installation Check: Manufacturer shall provide the services of a factory-trained representative to check the installation of all equipment installed in this Section. Equipment supplier's representative shall revisit Site as often as necessary until all trouble is corrected and equipment installation and operation is satisfactory to ENGINEER.

B. Manufacturer's representative shall provide all necessary tools and testing equipment required including noise level and vibration sensing equipment.

C. Inspection Report: A written report of the installation check shall be submitted to ENGINEER. The report shall certify that the equipment:

1. Has been properly installed and lubricated;

2. Is in accurate alignment;

3. Is free from any undue stress imposed by any connection or anchor bolts;

4. Has been operated under full load condition and that it operated satisfactorily to ENGINEER; and

5. That OWNER's representative has been instructed in the proper maintenance and operation of the equipment.

6. Furnish OWNER a copy of all test data recorded during the installation check including noise level and vibration readings.

HIGH EFFICIENCY MOTOR SCHEDULE NO. 16220.2
MOTOR OPERATING CHARACTERISTICS

		Efficiency (percent)						
	RPM	Guar.Min.		Nominal		Power Factor (percent)		
HP	Syn.	Full	1/2	3/4	Full	1/2	3/4	Full
1	1800	81.5	78.1	81.0	81.5	54.2	67.3	75.8
	1200	75.5	69.5	75.6	78.5	38.4	49.4	58.3
1.5	3600	78.5	78.4	80.2	81.5	75.3	84.4	88.8
	1800	81.5	79.2	82.9	84.0	52.1	65.1	74.0
	1200	81.5	80.5	83.4	84.0	44.0	56.6	85.6
2	3600	81.5	78.8	82.9	84.0	66.3	78.4	85.0
	1800	81.5	78.8	82.6	84.0	48.9	61.7	70.0
	1200	84.0	83.0	83.6	86.5	46.6	59.6	68.0
3	3600	84.0	75.4	84.3	86.5	69.7	80.0	85.6
	1800	86.5	86.9	88.5	88.5	62.3	73.9	79.9
	1200	86.5	84.5	87.5	88.5	45.9	58.3	68.0
5	3600	86.5	86.2	88.2	88.5	71.7	81.7	86.4
	1800	88.5	84.0	88.2	88.5	68.5	79.2	84.6
	1200	86.5	85.8	88.2	88.5	50.8	63.8	71.9
7.5	3600	86.5	82.9	86.7	88.5	75.9	84.3	88.1
	1800	88.5	89.2	90.3	90.2	66.5	77.2	82.4
	1200	86.5	87.5	88.8	88.5	58.6	68.8	73.7
10	3600	86.5	87.7	89.0	88.5	77.1	84.5	87.6
	1800	88.5	89.3	90.4	90.2	67.6	77.4	81.9
	1200	88.5	89.0	90.3	90.2	60.1	70.2	74.9
15	3600	88.5	82.3	87.4	90.2	81.1	87.2	90.4
	1800	90.2	91.0	91.9	91.7	68.5	78.1	82.3
	1200	88.5	89.9	90.6	90.2	67.4	77.1	81.4
20	3600	90.2	89.1	91.1	91.7	83.7	88.5	90.5
	1800	90.2	90.9	91.9	91.7	68.9	78.1	81.8
	1200	90.2	91.0	91.0	91.7	69.8	78.5	81.9
25	3600	90.2	91.6	92.0	91.7	81.9	88.6	90.6
	1800	91.7	92.8	93.2	92.4	72.7	81.4	84.5
	1200	90.2	90.0	91.4	91.7	79.8	84.5	85.5
30	3600	90.2	90.6	91.7	91.7	81.1	87.8	90.3
	1800	91.7	92.8	93.3	93.0	71.5	80.6	84.2
	1200	90.2	91.7	92.0	91.7	78.9	85.4	86.8
40	3600	90.2	89.1	91.2	91.7	83.8	88.6	89.9
	1800	91.7	91.0	92.6	93.0	71.6	80.6	84.2
	1200	91.7	93.0	93.3	93.0	80.9	86.4	88.0
50	3600	90.2	88.7	90.8	91.7	82.5	90.8	92.0
	1800	93.0	92.4	93.7	94.1	76.4	83.7	86.3
	1200	91.7	93.0	93.3	93.0	80.9	87.3	88.9
60	3600	91.7	89.9	92.0	93.0	84.9	89.9	91.6
	1800	93.0	93.2	94.0	94.1	76.3	84.0	86.8
	1200	91.7	92.5	93.1	93.0	75.8	82.9	85.5
75	3600	93.0	91.0	93.1	94.1	82.6	88.7	90.9
	1800	93.0	92.6	93.8	94.1	76.4	83.8	86.6
	1200	93.0	93.5	94.2	94.1	75.1	82.4	84.7
100	3600	93.0	91.3	93.3	94.1	86.1	89.7	91.0
	1800	94.1	93.8	94.8	95.0	83.8	87.6	89.0
	1200	93.0	93.1	93.9	94.1	72.5	80.0	83.2
125	3600	93.0	91.2	93.1	94.1	83.0	88.3	89.0
	1800	93.7	93.5	94.6	95.0	79.2	84.6	86.0
	1200	93.0	93.5	94.2	94.1	75.2	82.3	85.2
150	3600	93.0	91.8	93.4	94.1	85.3	89.3	89.1
	1800	94.1	93.7	94.7	95.0	81.6	86.4	86.6
	1200	94.1	94.1	94.9	95.0	77.2	84.4	85.7
200	3600	94.1	92.7	94.3	95.0	83.3	87.5	88.5
	1800	94.5	94.2	94.9	95.0	80.0	85.6	86.7
	1200	94.3	94.2	94.9	95.0	78.0	84.5	86.0
250	3600	94.3	94.8	95.5	95.3	83.0	87.5	88.5
	1800	94.3	96.0	96.0	95.8	79.5	85.6	83.0

END OF SECTION

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SECTION 16450

GROUNDING

PART 1 - GENERAL

1.1 SCOPE

A. This Section includes basic materials and methods for all Division 16 and related electrical work.

1.2 APPLICABLE REQUIREMENTS

A. National Electric Code (NEC)

PART 2 - PRODUCTS

2.1 GROUND RODS

A. Ground rods shall be a minimum of 5/8" diameter by 20' length & copper-clad, unless otherwise specified. Grounding accessories shall be as manufactured by Burndy, Erico or Thompson.

PART 3 - EXECUTION

3.1 INSTALLATION

A. End to end fixtures shall be continuously bonded. Grounding contact of receptacles shall be connected to a solidly grounded conduit system or to a system grounding conductor (not the system neutral) by a stranded copper wire not smaller than 12 AWG or shall be grounded in some other approved manner.

B. Bond all metal parts. Make equipment and bus connections with suitable lugs or clamps. Cadweld all wire-to-ground rod joints. Cadweld all wire-to-wire joints size 1/0 AWG and over.

C. Bond all conduits stubbing under switchboards, transformers and similar locations using bonding bushings. Bond each conduit separately.

D. Provide a bonding wire from grounding bushings on all conduit terminated at panels, boxes, wireways, panels, etc.

E. Provide a bond wire in all flexible metal conduits and connect to the boxes at each end in an approved manner.

F. Use PVC for sleeving grounding conductors, except that where sleeves are subject to extreme injury use rigid metal conduit bonded at both ends.

G. Grounding of all equipment should be accomplished with lugs equal to T & B "Locktite" one bolt hole tongue #31003 or equal.

H. All conduit to Service entrance equipment and Transfer Switch along with Load Center shall have Grounding Bushing on all conduit and ground to box, cabinet, etc. This will give an added protection in grounding all the electrical systems.

END OF SECTION

SECTION 16960

LIFT STATION CONTROL CABINET

PART 1 - GENERAL

1.01 DESCRIPTION

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 the Pump Stations. The specific control system proposed shall be subject to the approval of the Engineer.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Section 01340 – Shop Drawings, Working Drawings and Samples

C. Section 16050 - Basic Electrical Materials and Methods

D. Other Sections as applicable.

1.03 REFERENCES

A. UL 508 – Standard for Industrial Control Equipment

B. IEEE 28-1972 - Standard for Surge Arresters (Lightning Arresters) for Alternating Current Power Circuits

C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low- Voltage (1000 V and Less) AC Power Circuits

D. NEMA Publication 250 – Enclosures for Electrical Equipment (1000 volts Maximum)

E. NFPA 70: National Electrical Code

1.04 APPROVED MANUFACTURERS:

A. Atlantic Environmental

B. Champion Controls

C. Hall Fountain

D. No Substitutions Permitted

1.05 SUBMITTALS

A. Comply with Section 01340 – Shop Drawings, Working Drawings and Samples and Division 16, Electrical.

B. Refer to Bill of Materials on Drawing E-11.

C. Provide complete and detailed manufacturer's and pump system supplier's descriptive information, and integrated shop drawings on the following items proposed for the 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. Push button, indicating lights and selection switches.
10. Elapsed time meters
11. Programmable controller.
12. Motor starters.
13. Level control system including level indicator/controller, and all associated equipment, piping, valves, and fittings.
14. Circuit breaker and interlocks.
15. Instrumentation system schematic.
16. Special mechanical and electrical features (e.g., power cables, etc.) required for pump systems to meet Class I, Division 2 requirements.
17. Enclosures.
18. Conduit and Pull Box Schematic Drawings.

D. Incomplete submittals by the pump system's supplier (e.g., catalog cuts with no integrated or coordinated drawings depicting equipment function or operation) will be returned without action.

PART 2 - PRODUCTS

2.01 GENERAL

A. All discrete input and output signals of the control panels to/from devices external to this pump package shall be isolated contact closures, rated for 10 amps, 120V AC continuous service.

B. All panel construction shall be completed in a UL 508 Panel Fabricator Shop, and be UL 508 labeled.

2.02 CONTROL CABINET

A. The Control Panel Shall Include:

1. Terminal blocks for all incoming or outgoing conductors.
2. All identified and necessary operator interface devices.
3. Control hardware.
4. UPS for control functions.
5. All necessary control and time delay relays.
6. All necessary alarms, fuses, circuit breakers and other miscellaneous items necessary to fulfill the functions described or required in this and other applicable sections of these Specifications.
7. 24 V power supply.
8. Surge protection.
9. Other electrical equipment shall be as specified on Drawings.
10. Provide volatile corrosion inhibiting capsules in each control panel to protect all exposed metal surfaces for a period of at least 2 years.

B. Control cabinet fabrication, electrical components and wiring, and workmanship shall conform to the following requirements:

1. Control cabinet shall be grey powder painted steel 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 at least NEMA 4X rated enclosure.

2. Dead front 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 latching system. 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 dead front. 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 top of 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-volt, single phase, 60-Hz service entrance from the LDP panel, unless otherwise shown on the Drawings. Interceptor capacity to be 22,000 amps minimum, size to actual available fault current.

7. Power Distribution Within Cabinets

   a. 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.

   b. Power wiring shall be distributed using power distribution terminal blocks. Leap frogging will not be acceptable.

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, and according to specification drawings 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.

9. Terminal Blocks

   a. Terminal blocks shall be one-piece molded plastic blocks with screw-type terminals and barriers rated for 600 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, pre-insulated, fork-tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the terminated wires.

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 28 VDC. 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 the Drawings.

   b. All relays shall have a screw terminal interface with the wiring. Terminals shall have a permanent, legible identification. Relays shall 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. 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. Do not leave extra wire inside wire ways. Provide abrasion protection for any wire bundles that 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 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 from 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

a. Install and wire any required protector-monitoring relay provided by pump manufacturer.

15. Wet Well Level Responsive Automatic Pump and Alarm Control System

a. 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, as shown on Drawings.

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.

c. Bubbler system power shall 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. 100 watts; 24-28 volts

b. DIN Rail Mount, as shown on Drawings.

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 VACS, 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-inch 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 control system shall be completely functional and include not less than the following features:

1) Controller and transducer to be integrated standard products from experienced manufacturers.

2) 0 to 13 feet wet well level range for pump station D-10 and 0 to 14 feet wet well level range for pump station D-11.

3) LED indicator for control and alarm circuit, as shown on Drawings.

4) Ten second time interval after one pump starts before another pump is allowed to start.

5) Minimum pump run time and maximum number of starts per hour per pump manufacturer's requirements.

6) 120V AC power supply, fused in controller.

7) Power line transient protection for control system. Surge protection unit shall be SOLA, Model STV25K.

8) Ten-amp, 250V AC rated control and alarm contacts.

9) Terminal blocks and power components UL 508 recognized.

10) Form C SPDT alarm relay contacts.

11) High and low, level alarm sensing.

12) UL listed barrier/clamp-type, rear terminal block to accept

two AWG No. 12 per panel.

13) Extractor type fuse block, rear accessible.

14) Complete factory standard system.

15) One-year factory warranty on parts and labor.

b. An inner-door mounted ground fault interrupter (GFI) type convenience receptacle, rated at 20 amperes, shall be supplied for operating trouble lights, drill, etc. as shown on Drawings.

c. Controller shall be Allen-Bradley Micrologix 1100 BWA with the following characteristics and appurtenances:

1) 10 - 24 V digital inputs

2) 2- 10 V analog inputs

3) 6 Digital relay outputs

4) Ethernet, RS-232, and Modular Communications Interface

d. Operator Interface Panel (OIP) shall be

1) Color 10.4 inch touchscreen

2) DC input

3) Allen-Bradley PanelView Plus 1000 interface

21. For Class I, Division 2 areas, utilize "EYSR" split-case fittings as manufactured by Crouse-Hinds, as required.

2.03 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 construction. The CONTRACTOR shall provide coordination at no extra cost to the Owner.

2.04 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 as per Drawings.

C. Unit shall be:

1. As specified on Drawings.

2.05 PUSH BUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES

A. As specified on Drawings.

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. Motor starters shall be as specified on Drawings.

2.09 CURRENT TRANSFORMERS

A. Current Transformer Ratio shall be coordinated with the actual current of the installed motor.

B. Installed on on phase of the motor leads to proportionately convert motor amperage to a readable 4 to 20 mA signal. Provide isolation as necessary.

C. Manufacturer: Rochester Instruments; or equal.

2.10 INTRINSIC SAFETY BARRIERS

A. Intrinsic safety barriers shall provide a safe energy level for exposed wiring in a Class I, Division I, and Group D area when the circuit in the non-hazardous 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 works "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.

2.11 CIRCUIT BREAKERS

A. As specified on Drawings.

B. Mechanical Interlocks – Furnish externally mounted mechanical interlocks as indicated on the Drawings.

2.12 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. Phase Monitoring Relay should be located on MDP (Main Distribution Panel), contact relays should be wired to control panel terminals as per drawings.

2.13 CONDUCTORS

A. General – The use of a manufacturer's name and model or catalog number is for establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the General Conditions.

B. Conductors

1. As specified in Section 16120 "Conductors",

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.

2.14 LINE REACTORS

A. Provide line reactors ahead of pump drives.

B. Line reactors shall match the specific pump supplied.

2.15 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 phase monitor.

c. One of each size control fuse.

d. One pump control module (PLC) furnished for each pump station per Paragraph 2.02(20)(d).

e. One OIP.

PART 3 - EXECUTION

3.01 INSTALLATION OF CONTROL PANEL

A. The control panel is a NEMA 4X, steel gray painted, ventilated enclosure. Mount as shown on the Drawings.

B. 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.

C. Field panel and concrete slab to be able to withstand 140 mph wind loading. Provide mounting to slab in accordance with manufacturers recommendations.

D. Stub 2-inch conduit 5 feet into unpaved area, cap, and identify location on Record Drawings.

E. Bond panel(s) to grounding loops and comply with the provisions of Section 16450, Grounding.

3.02 TEST AND ACCEPTANCE PROCEDURE FOR THE CONTROL PANEL

CITY personnel will be responsible for programming and testing PLC, Operator Interface panel and any instrumentation located inside the Pump Control Panel. All other instrumentation outside the Pump Control panel shall be programmed or configured by the CONTRACTOR or the CONTRACTOR REPRESENTATIVE.

The Pump Control Panel MANUFACTURER shall schedule a factory acceptance test for the control panel with the CITY personnel. Testing will be comprised of functionality,

workmanship, and ability of the contractor to build the panel following the City Standard Drawings and Schematics. During this test, the CITY representative(s) will load the PLC program, and test the functionality of the panel.

During testing and evaluation, any punch list items must be resolved before product will be accepted and delivered to the job site. If the unit fails the City testing, the Pump Control Panel MANUFACTURER shall make any repairs necessary to make the unit functional. The unit will then be re-tested by the City personnel.

The City will not pay for or be liable for any costs associated with the failed unit. It will be the Pump Control Panel MANUFACTURER's responsibility to make any necessary changes at their facility and schedule the panel to be re-tested at no additional cost to the City.

CONTRACTOR shall coordinate field acceptance test and testing with CITY personnel, Pump MANUFACTURER, Pump Control Panel MANUFACTURER, and VFD MANUFACTURER.

END OF SECTION

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APPENDIX A

GEOTECHNICAL REPORT

RADISE
Infrastructure Engineers • Software Developers

February 28, 2017

Tetra Tech Water/ Environment & Infrastructure Group
201 East Pine Street
Suite 1000
Orlando, Florida 32801

Attn: Ms. Janine M. Alexander, P.E.
Phone: 407.480.3913
Fax: 407.839.3970
Email: janine.alexander@tetratech.com

RE: Geotechnical Services Report
Pump Station D-10 and D-11 Flow Analysis
Fort Lauderdale, Florida
RADISE Project No: 161206

Dear Ms. Alexander,

RADISE International, LC (RADISE) is pleased to submit this Geotechnical Services Report for the above-referenced project. RADISE has completed our geotechnical services as per of our Agreement executed on December 5th, 2016.

This report presents the results of our soil borings, and includes our recommendations for the proposed New Pump Stations.

We appreciate the opportunity to work with Tetra Tech on this project, and trust that the information presented is clear. Should you have any questions with this report, or if we can be of additional assistance as this project develops, please contact us at (561) 841-0103.

Sincerely,

RADISE International
Infrastructure Engineers & Software Developers

3.1.17
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Staff Engineer

2/28/17
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ATTACHMENTS

1.0 INTRODUCTION

RADISE understands that the City of Fort Lauderdale is planning to provide improvements to two existing pump stations within Hendricks Isle and Isle of Venice, in Fort Lauderdale. To aid in the planning and design, RADISE was requested to provide subsoil exploration and evaluation services that included; drilling of exploratory borings and testing to identify the soil and groundwater conditions, and to identify possible geotechnical concerns, and to provided recommendations for the required foundations for a new pump station.

2.0 PROJECT DESCRIPTION

The project is located in Fort Lauderdale, Florida and includes two (2) neighbor islands, Hendricks Isle and Isle of Venice. The approximate limits of the projects are presented on the attached *Vicinity Map*, Sheet 1.

3.0 PURPOSE AND SCOPE OF WORK

The purpose of this study was to perform a limited exploration of the subsurface conditions within the proposed project area. More specifically, the intended purpose of RADISE's work included the following:

- Development of the anticipated soil profile and subsurface conditions within the depth of influence of the proposed construction.
- To assess site preparation requirements and engineering criteria for placement and compaction of approved fill materials.
- Identification of critical design or construction considerations based on the soil and groundwater conditions encountered in the borings.

The scope of work for this project included the following:

1. A site visit to field mark (paint and/or stake) the planned boring locations and observe existing site conditions.

2. Contacting Sunshine One-Call to request field location and clearance of underground utilities within the areas of the borings as required per Florida Statutes.

3. Mobilization of personnel and drilling equipment to the site, and the drilling of two (2) Standard Penetration Test (SPT) borings to depths of twenty-five (25) feet below the existing ground surface. The depth to groundwater in each boring was also measured and following completion of the drilling and sampling operations, the boreholes were backfilled with a neat cement grout.

4. A RADISE geotechnical engineer classified the collected soil samples using the Unified Soil Classification System (USCS).

5. Performed Laboratory testing of selected soil samples for index properties limited to moisture content tests, percent passing No.200 sieve tests and, organic content tests.

6. Preparation of this geotechnical report which includes, but not necessarily be limited to:

    - Detailed graphical logs of the soil boring logs showing the groundwater level and soil classifications.
    - Presentation of the results of the SPT borings.
    - Discussion of the findings and provide geotechnical recommendations for the proposed New Pump Stations.

4.0 FIELD EXPLORATION

4.1 SOIL BORINGS

The field exploration program to evaluate the existing subsurface conditions for the project consisted of two (2) SPT borings. The SPT borings were drilled to depths of twenty-five (25) feet below the existing ground surface. The approximate locations of the SPT borings are depicted on the attached *Test Location Plan*, Sheet 2. The Latitude and Longitude coordinates of the test boring locations were obtained by the RADISE field drilling crew using hand-held GPS equipment. The location data can be found on the attached *SPT Boring Subsurface Profiles*, Sheet 3.

The SPT borings were performed in general accordance with ASTM D 1586, “Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils”. Upon retrieval, the split-spoon soil samples were visually classified and placed in moisture proof containers for transportation to our laboratory.

The depth at which groundwater was encountered in the boring was measured. Each borehole was backfilled with grout to the ground surface after the completion of drilling operations.

5.0 LABORATORY TESTING

5.1 GENERAL

At the time of drilling, the soil samples obtained from the soil borings were visually classified in the field in general accordance with the Unified Soil Classification System (ASTM D 2488). The field classifications were subsequently confirmed by a RADISE

geotechnical engineer in the laboratory based on visual observations supplemented by laboratory tests results performed on selected representative samples. Laboratory index testing performed in selected samples consisted of percent passing the No. 200 Sieve, Moisture and Organics Content tests.

5.2 LABORATORY TEST RESULTS

The following list summarizes the laboratory tests performed by type and number.

- Two (2), Moisture Content Tests (ASTM D 2216).
- One (1), Organics Content (ASTM 2216 D).
- One (1), Percent Passing No. 200 Sieve Tests (ASTM D 1140).

All of the laboratory test results are presented on the attached *SPT Boring Subsurface Profiles*, Sheets 3 and in the *Laboratory Results Summary*, Table 1. Please note that two moisture content tests were performed on samples obtained from boring B-1. The two moisture content tests are independent of one another and was assigned to determine the moisture content for two very different soil samples that were obtained from different depths in boring B-1. The soil samples were determined to be Clay and Muck. No lab testing was needed on soil samples obtained from boring B-2 because similar soils were encountered in boring B-1. We were able to classify all the soil samples from both borings visually and with the aid of the lab results.

6.0 SUBSURFACE CONDITIONS

6.1 STRATIGRAPHY

Stratification of the explored soils is based on visual examination of the recovered soils samples, laboratory classification and index testing, and interpretation of the field boring logs by a project geotechnical engineer. Subsurface profiles showing the soil stratification at the boring locations were developed and are presented on the attached *SPT Boring Subsurface Profiles*, Sheet 3. Stratification lines represent approximate boundaries between soil types, but the actual transition between layers may be gradual or abrupt. Additionally, soil and groundwater conditions will vary between boring locations.

The soils encountered in the two soil borings for the top 4 to 6 feet generally consist of Sand with traces of organics, silt and, limestone fragments. In boring B-1, performed on the Isle of Venice, an approximate two (2) feet thick layer of Clay underlies the Sand with traces of organics, silt and, limestone fragments. Both borings from approximately 6 to 10 feet below the existing ground surface encountered soil containing appreciable amounts of organics matter classified as Organic Sand to Muck. The layer of organic material is underlain by Limestone. The soil types are described in the following table:

Stratum No.	Description	USCS Class.
1	Gray, brown to dark brown, fine to medium SAND, trace Gravel, trace Organics, trace Limestone fragments	SP
2	Tan, dark gray, fine to medium SAND, with Limestone fragments, trace Silt	SP
3	Gray to dark brown, ORGANIC SAND	SP-PT
4	Dark Gray CLAY	CL
5	Dark Brown MUCK	PT
6	Tan LIMESTONE	-

It is noted that the Layer 5 Dark Brown Muck was encountered in the borings performed in the both areas of the project. Review of the boring logs indicates what appears to be layers of fill soils, which were placed over remnant buried mangrove, preserve areas along the Intracoastal waterway.

6.2 GROUNDWATER

Groundwater was encountered in both SPT borings at the depth of three (3) feet below the existing ground surface. However, the groundwater levels will fluctuate with the seasonal variations of precipitation and tides. It is our recommendation that the seasonal high groundwater table levels in the project areas be based on the normal high tide water levels of the existing Hendricks and Venice Isles waterways adjacent to the project areas. Periodic very high tide conditions can also occur seasonally in response to off-shore tropical storms or gravitational forces especially during the hurricane season and winter/spring season's respectively.

7.0 DISCUSSIONS AND RECOMMENDATIONS

The upper several feet of Sand encountered in both borings performed for this study, will be suitable for use as structural fill and backfill material for the proposed construction. However, the Hendricks Isle and Isle of Venice areas are likely a historical lands reclamation area. This area as well as several others in the surrounding region were infilled sometime in the historical past to facilitate the construction of the present residential communities. Fill was placed over the pre-existing muck deposits which covered the Hendricks Isles and Isle of Venice as well as similar adjacent areas.

The presence of the buried organics will be problematic to the installation of underground utilities especially when the inverts of such systems are founded in or below the organic layers. Such organics have very low shear strengths and will not support significant excavations made within or through them.

As such, it is anticipated that significant shoring/sheet piling will be required to install infrastructure systems in this area including heavily loaded wet wells and valve vault structures.

Concrete wet wells are anticipated to be constructed well into the underlying limestones with the bottoms of the wet wells approximately 25 feet below the existing ground surface. The buried organics encountered are expected to have little effect on the stability of the wet well structures in the ground since the bottom of the wet wells will be bearing in the limestone layer.

Valve vault structures are anticipated to be constructed above the buried organics. The Organic material can remain in place and a geogrid layer can be placed below the bottom of the valve vault bedding materials during construction.

7.1 CLEARING AND GRUBBING

Any clearing and grubbing should include the complete removal and disposal of all grass, associated root systems, topsoil, rubbish, debris, demolished material, pavement and all other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas.

7.2 UNDERGROUND UTILITIES AND STRUCTURES

Existing underground utilities and structures will be present in the proposed construction area. Any such utilities will need to be properly located, identified/marked, excavated where required by the design. Utilities to remain shall be properly and safely supported as needed to construct the project. The excavation bottoms should be cleaned of any undesirable materials prior to placing any engineered backfill.

Site preparation, excavation, and backfilling for new utilities or re-aligned utilities should follow all of the applicable recommendations of this report.

7.3 FOUNDATION RECOMMENDATIONS

Based on the geotechnical exploration and providing the subgrade preparation procedures presented below are followed, it is our opinion that the site is suitable for the planned wet well construction. The proposed structures may be supported on a mat foundation.

Following the in-situ foundation preparation recommendations below, the proposed structure foundations may be designed using a net allowable soil bearing pressure of up to 3,000 pounds per square foot (psf) bearing within the prepared existing limestones beneath the peats. The net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. To verify suitable bearing, we recommend that the foundation excavation subgrade be checked by a geotechnical engineer just prior to concreting. The excavation bottom should be kept as dry as practical during construction.

Resistance to lateral loads can be derived from 1) passive pressure acting on the sides of the foundations and any grade beams, and 2) lateral resistance along the base of the foundations. Lateral resistance derived from friction between the soil and the bases of the footings should be calculated based on a friction factor of 0.35 times the base contact bearing pressure. Passive resistance of the upper foot of soil should be neglected, unless it is confined by a slab or pavement. Passive resistance on the sides of the foundations should be ignored if these soils can be hypothetically washed away during a hurricane storm event.

A subgrade modulus of 250 psi/in may be used in the design of a mat/raft foundation provided that the subgrade and subsequent engineered granular fill is prepared as described below. A 6-inch leveling layer of clean (less than 5% passing a #200 sieve) granular fill is recommended to be placed directly below slab-on-grade floors where appropriate. The granular fill should be compacted until densities of at least 95% of the maximum dry density as determined by ASTM D1557, the Modified Proctor method. Based on our assumption of a structure supported on a shallow footing or mat foundation system, the total settlement should be less than 1.0 inches, and differential settlements should be less than 0.50 inches.

7.4 RECOMMENDED SOIL PARAMETERS FOR UNDERGROUND STRUCTURE DESIGN

Wet wells for this project should be designed to resist pressures exerted by the adjacent soils and hydrostatic head. For walls that are not restrained during backfilling but are free to rotate at the top, active earth pressure should be used in design. Walls that are restrained should be designed assuming at-rest pressures. Recommended soil parameters for the granular soils encountered at the site are given in the following tables.

SPT BORING B-1

Depth (ft - ft)	Average N_{AUTO}	Average N_{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, Ka	Passive, Kp	At rest, Ko
0 - 15	12	15	32	112	50	0.307	3.255	0.470
0 - 20	12	15	32	112	50	0.307	3.255	0.470
0 - 25	12	15	32	112	50	0.307	3.255	0.470

SPT BORING B-2

Depth (ft - ft)	Average N_{AUTO}	Average N_{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active, Ka	Passive, Kp	At rest, Ko
0 - 15	8	10	30	108	46	0.333	3.000	0.500
0 - 20	9	11	31	110	48	0.320	3.124	0.485
0 - 25	9	11	31	110	48	0.320	3.124	0.485

Design should incorporate hydrostatic effects. In order to avoid wall damage due to excessive compaction, hand operated mechanical tampers should be used to densify backfill soils. Heavy vibratory compaction equipment should not be allowed within five feet of walls. The soils behind walls should consist of clean sands as described in the Select Fill Composition, Placement and Compaction section of this report and should be compacted to approximately 95 percent of the material's modified Proctor (ASTM D-1557) maximum dry density.

7.5 EXCAVATIONS

The Contractor should be solely responsible for making excavations in a safe manner and to provide appropriate measures to retain side slopes to ensure that persons working in or near the excavation are protected.

All excavations should be made in accordance with applicable State, Federal and OSHA requirements. The upper sand encountered in the borings generally consist of relatively clean sands. OSHA 29 CFR part 1926 (Subpart P, Excavations) defines such soils as Type C soils. As such, shallow temporary side slopes in fully dewatered excavations could be made at a 1½H: 1V inclination or flatter. The Contractor should evaluate adjustment to this side slope inclination and/or the use of sheeting, shoring or trench boxes for the muck and clay layers encountered for this geotechnical study or if other soil strata encountered during construction. Excavations to be restrained by structural lateral support systems should be designed by a Structural Engineer registered in the State of Florida.

It is noted that significant Muck deposits were encountered in the borings at depths between 4 to 10 feet deep. These mucks are underlain by a medium dense weakly cemented limestone to the termination depth of the boring at a depth of 25 feet below the ground surface. Correspondingly, for new or replacement shallow utilities installations to be installed in the upper several feet below the ground surface, such utilities are expected to likely be installed or to be placed just above the Muck deposits during the utility excavation and installation process. Deeper excavations and installations of the Wet Wells will extend through the upper peats,

In any utility replacement areas constructed with utility systems of a similar size, nature and invert elevation, settlement of the replacement system is expected to be minimal due to underlying peat consolidations, which would have occurred due to the original installation.

In areas where new below grade utility systems will be installed at excavation elevations into the underlying peats, the weight of the filled utility and new granular fill used to backfill the excavated trench volumes, will likely cause some consolidation of the remaining peats below the backfilled new utility system excavation level. Depending on the thickness of the remnant peats below the utility system excavation, settlements of an inch to several inches might be expected to occur if the underlying peats are not removed. The underlying peat settlements will occur as a result of the differential soils loads imposed

on the bottom of the trench/exposed peat surface, by the new utility system weight combined with the unit weight of the new backfill which is over and above the weight of of the upper sand and peat volumes removed. Complete peat removal below the utility system is an option to be considered. Additionally, a series of sand filled columns may be installed to support the utility but the nature, sizing and joint spacing of such systems would need to be provided at a later design progress date to provide more detailed recommendations in this regard.

For utilities to be installed within the upper fill sands, the utility and trench backfill weight should be close to or less than the weight of the sand removed and as such, settlements of smaller diameter, shallow piping systems and backfill thereof, are not expected to result in any significant settlement of the backfilled trench surface. Sections 7.5 and 7.7 of this report also includes additional recommendations in this regard.

7.6 DEWATERING

At the time of the borings tests (January, 2017), groundwater was encountered at a depth of approximately three (3) feet below the existing ground surface. In-the-dry construction of the underground utilities will require groundwater lowering and control of groundwater seepage depending on the utility design installation depths.

Dewatering of the excavations may necessitate the use of sumps, wells, well points or combinations thereof however, dewater within the peats will be problematic due to the anticipated peat plugging of the well screen slots. The Contractor's dewatering consultant/sub-contractor shall be responsible and liable for the design and operation of any needed temporary dewatering systems as well and temporary excavation support.

Control of groundwater should be accomplished in a manner that preserves the stability and integrity of the excavated subgrade soils and does not cause instability of the excavation sidewalls. The dewatering system employed should be capable of maintaining a pre-drained surface a minimum of twenty-four (24) inches below the excavation bottoms.

7.7 PIPE BEDDING

The clean upper sands encountered in the borings are expected to provide good support for utility pipelines without the need for bedding when the invert elevations are at least twenty- four (24) inches above the groundwater level (natural or pre-drained by dewatering). If the muck soils exist at or below the pipe invert, these soils should be over-excavated at least 24-inches and replaced with compacted clean sand or FDOT No. *57* coarse aggregate. A separation geotextile non-woven fabric should be over the top of any #57 stone in order to prevent the movement of any granular backfill into the open #57 stone void volume.

The bedding surface should be uniformly compacted to a density of not less than 95 percent of the maximum dry density in accordance with ASTM D 698, the Standard Proctor Method, or as per the project specifications.

7.8 TRENCH BACKFILL AND COMPACTION

Soils used to backfill utility excavations should consist of clean sands having no materials larger than one inch in size, not more than ten (10) percent passing the U.S. Standard No. 200 sieve, and not more than Three (3) percent organics or other deleterious materials by dry unit weight. The subsurface soils encountered at this site appear to meet these criteria and are suitable for reuse as backfill once approved by a geotechnical engineer.

Granular backfill should be placed at a moisture content within 3 percent of its determined ASTM D 1557 Modified Proctor Method optimum moisture contents. Fill shall be placed in level lifts whose thickness does not exceed eight (8) inches. Each fill lift should be stable, unyielding and uniformly compacted to at least 95 percent of the maximum dry density in accordance with ASTM D 1557, or as per the project specifications. We recommend the use of only relatively light, hand-held compaction equipment in the densification operations around utilities and to a height of two (2) feet above the utility to limit the potential damage to the pipelines and buried structures.

7.9 SELECT FILL COMPOSITION, PLACEMENT AND COMPACTION

Site structural fill and backfill required for construction, should consist of clean, granular materials that are free of debris, cinders, combustibles and cellulose. The fines content (i.e., material passing U.S. Standard Number 200 sieve) should not be more than ten (10) percent by weight, no particle sizes larger than three (3) inches in any direction and the organic content should not exceed three (3) percent by dry weight. The on-site sand appear to meet the above criteria above and are suitable for use as structural fill and backfill material.

The granular fill should be placed at a moisture content within -3 to +2 percent of its Modified Proctor (ASTM D 1557) determined optimum moisture content in level lifts whose loose thickness does not exceed twelve (12) inches in thickness. In areas where heavy equipment cannot be operated for compaction, the fill should be placed in 6-inch thick level lifts. Each fill lift should be stable, unyielding and uniformly compacted to ninety-five (95) percent of the ASTM D 1557 maximum dry density, as verified by a geotechnical engineer. We recommend the use of only relatively light, hand-held compaction equipment in the densification operations adjacent to utilities and buried structures in order to limit the potential damage to the pipelines and buried structures.

7.10 PRE-CONDITION SURVEY AND VIBRATION MONITORING

Care should be exercised during construction and while backfilling, to avoid damaging any nearby structures. Prior to commencing with construction and any sheet piling

installations and compaction operations, the existing conditions of the adjacent structures should be documented with photographs and a pre-construction survey.

While any sheet piling or structural back filling compaction operations are underway, vibration monitoring should be performed. During any sheet piling operations, it may be necessary to control and vary hammer operations/energy and vibration generations to mitigate vibration transmissions to adjacent residences Heavy vibratory compaction should cease if deemed detrimental to adjacent structures. It is recommended that any heavy vibratory roller remain a minimum of seventy-five (75) feet away from existing structures. Within this identified zone, we recommend that the compactor be operating in the static mode.

7.11 OBSERVATION AND TESTING

It is recommended to provide soil engineering testing and inspection services during the excavation and construction phases of the project. This is to observe compliance with the design concept, specifications and recommendations, and to allow design changes in the event subsurface conditions differ from those anticipated.

8.0 LIMITATIONS

This report is intended for geotechnical purposes only, and not to document or detect the presence, or absence, of any environmental conditions or contaminates at the site, or to support any environmental assessment of the site.

The analysis and recommendations presented in this report are based upon our interpretation of the subsurface information revealed by the test borings and our understanding of the proposed design and construction work. The report does not reflect variations in subsurface conditions that may exist between or beyond the borings performed. Variations in soil and groundwater conditions should be expected, the nature and extent of which might not become evident until construction is undertaken. If variations are encountered, and/or the scope of the project altered, a geotechnical engineer should be consulted for additional recommendations.

RADISE appreciates the opportunity to be of service to you. Please feel free to contact us at 561-841-0103 if you have any questions or comments regarding this report.

Respectfully submitted
RADISE INTERNATIONAL, L.C.

REVISIONS							Names	Dates
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	K.A.	01/09/2017
						Checked by	A.B	01/09/2017
						Designed by		
						Checked by		
						Approved by		

RADISE
Infrastructure Engineers & Software Developers

LICENSE NO. - 8901

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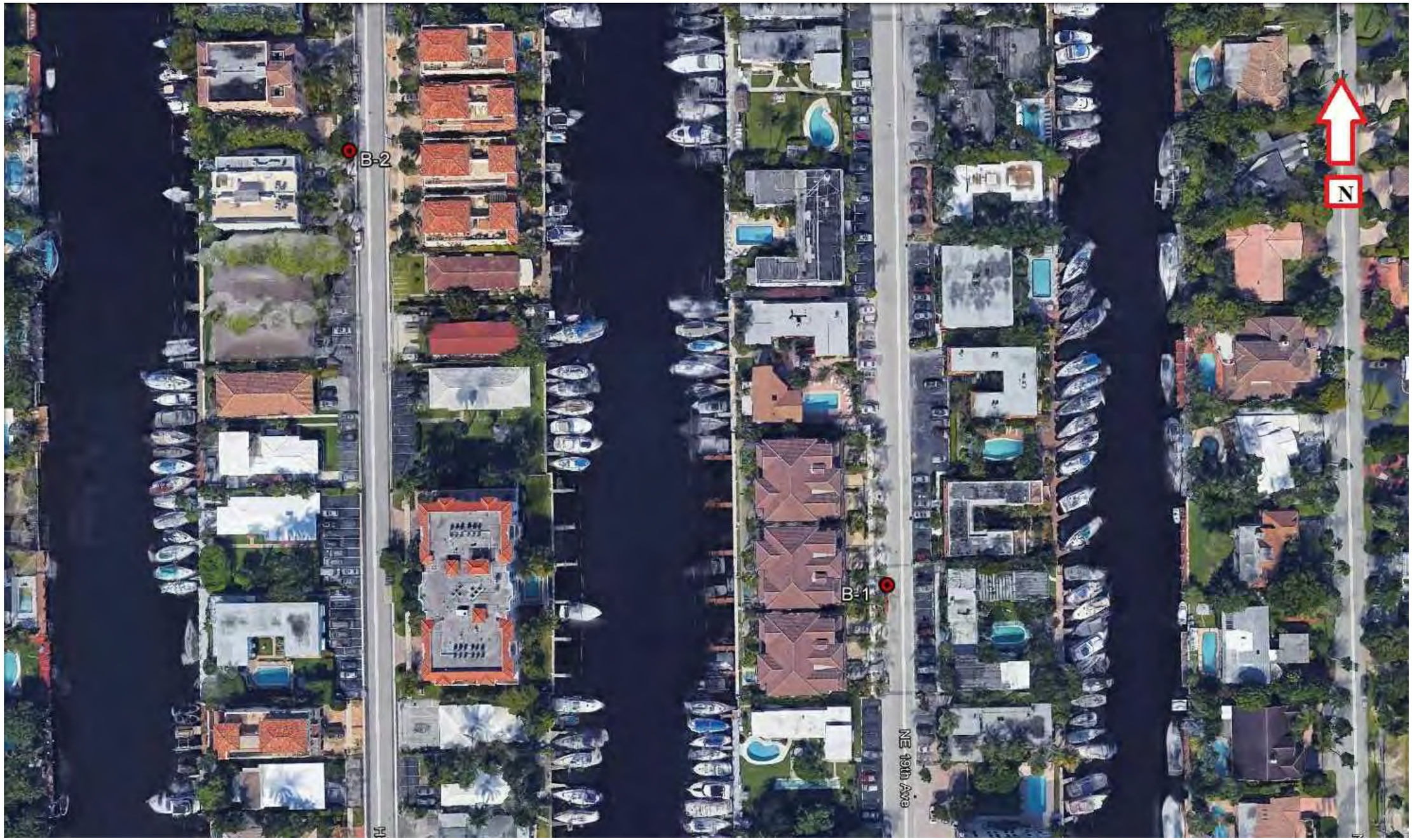
TEL 561-841-0103 FAX 561-841-0104
URL : http:// www.radise.net

CITY OF FORT LAUDERDALE		SCALE: VERTICAL N.T.S.	SHEET TITLE: VICINITY MAP	SHEET NO. 1
COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: PUMP STATION D-10 AND D-11 FLOW ANALYSIS	RADISE PROJECT NO: 161206
BROWARD	TETRA TECH			



LEGEND

TEST NUMBER AND APPROXIMATE LOCATION

REVISIONS							Names	Dates
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	K.A.	01/09/2017
						Checked by	A.B	01/09/2017
						Designed by		
						Checked by		
						Approved by		

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CITY OF FORT LAUDERDALE

COUNTY	CLIENT
BROWARD	TETRA TECH

SCALE: VERTICAL N.T.S.

SCALE: HORIZONTAL N.T.S.

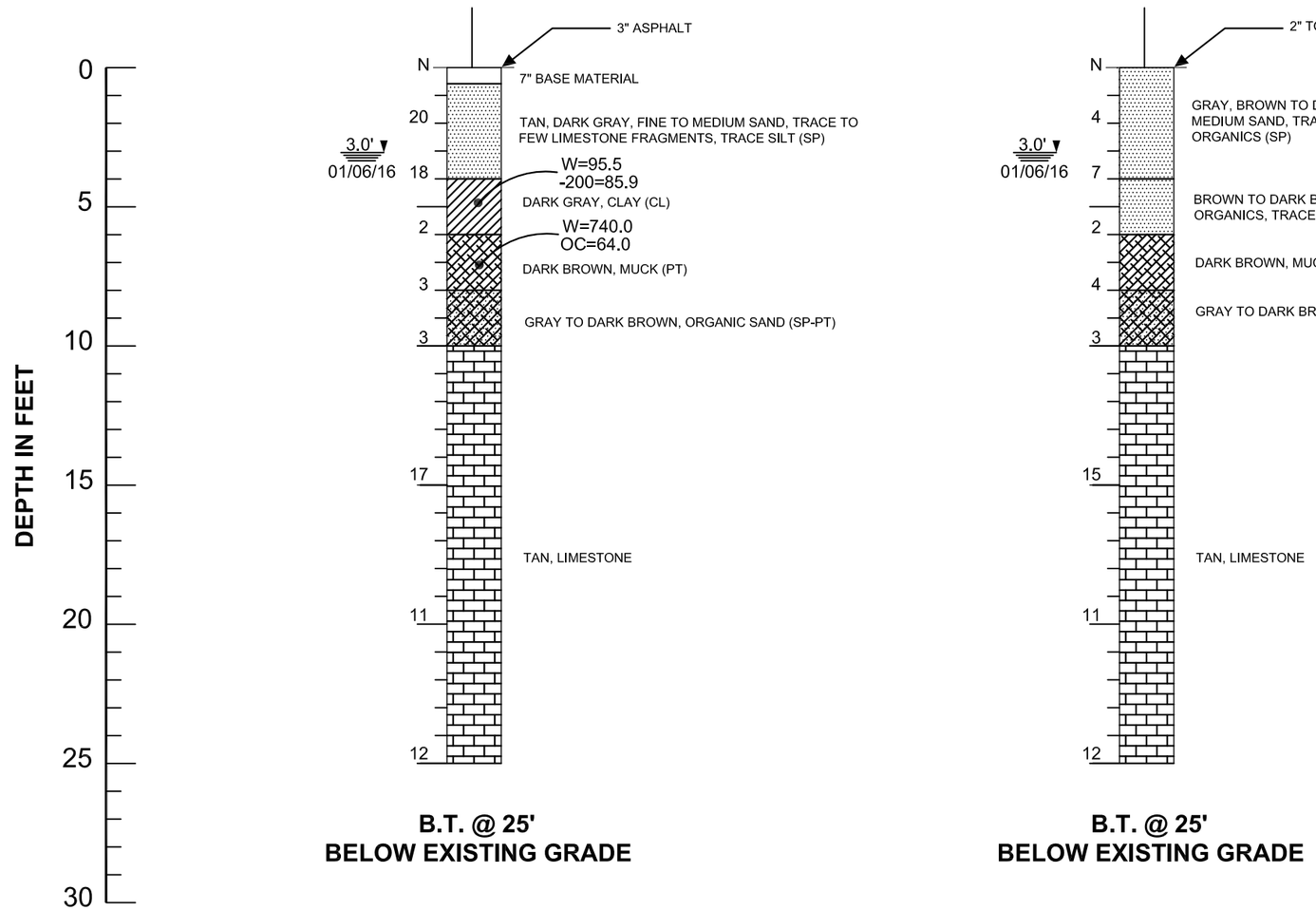
SHEET TITLE: TEST LOCATION PLAN

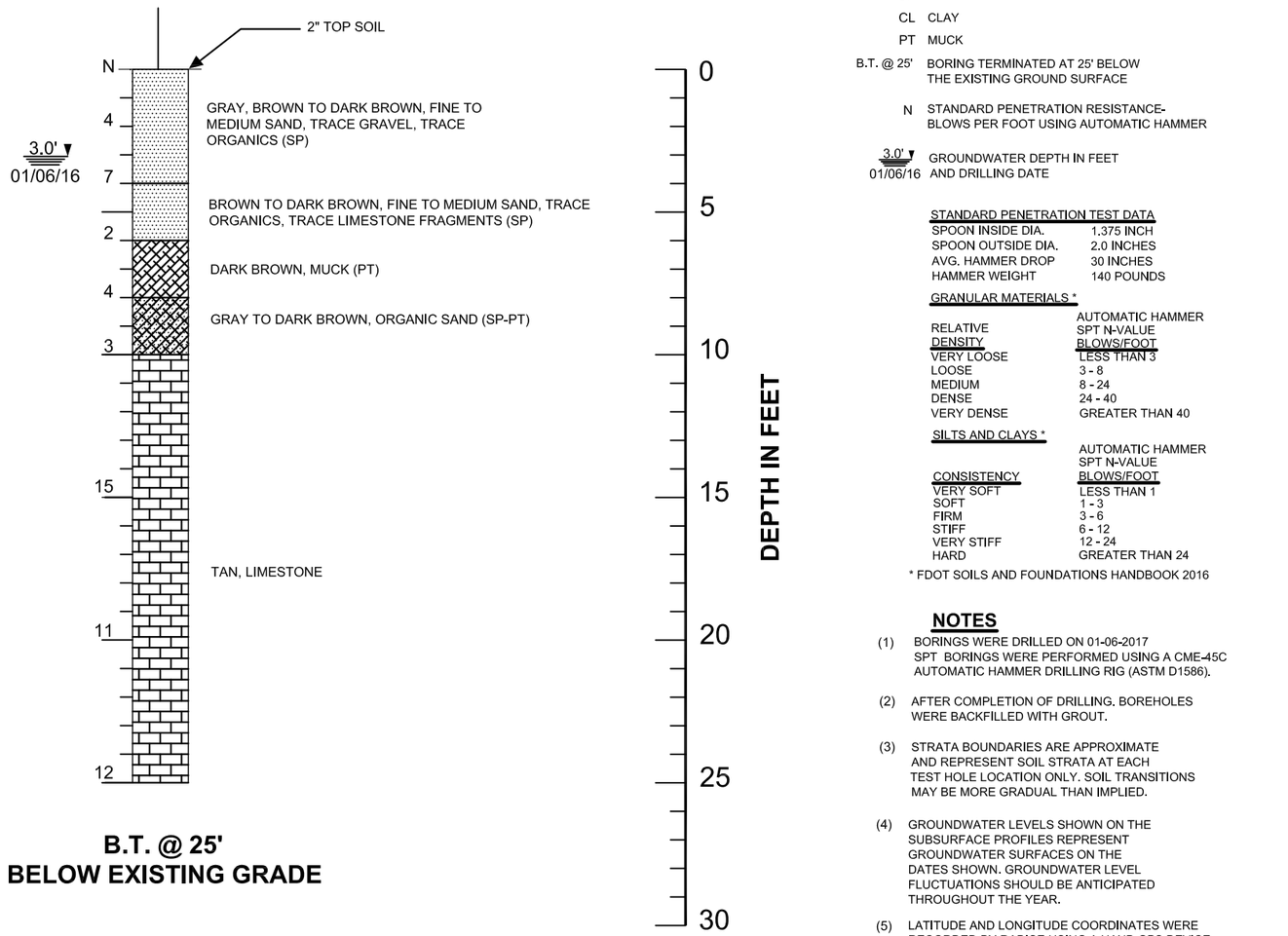
PROJECT NAME: PUMP STATION D-10 AND D-11 FLOW ANALYSIS

SHEET NO. 2

RADISE PROJECT NO: 161206

	B-1	B-2
BORING NO.	B-1	B-2
ELEVATION:	N/A	N/A
LATITUDE:	26°7'26.92"	26°7'30.75"
LONGITUDE:	W080°7'14.16"	W080°7'19.34"
RIG:	CME 45	CME 45
HAMMER:	AUTO	AUTO
DRILLER:	TIM F.	TIM F.
DATE:	01/06/2017	01/06/2017





LEGEND

- SAND
- CLAY
- MUCK
- LIMESTONE

W	MOISTURE CONTENT (%)
OC	ORGANIC CONTENT (%)
-200	AMOUNT PASSING US STANDARD 200 sieve (%)
PT- SC - SP	UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D 2487)
SP	POORLY GRADED SAND
CL	CLAY
PT	MUCK
B.T. @ 25'	BORING TERMINATED AT 25' BELOW THE EXISTING GROUND SURFACE
N	STANDARD PENETRATION RESISTANCE- BLOWS PER FOOT USING AUTOMATIC HAMMER
3.0' ▼ 01/06/16	GROUNDWATER DEPTH IN FEET AND DRILLING DATE

STANDARD PENETRATION TEST DATA	
SPOON INSIDE DIA.	1.375 INCH
SPOON OUTSIDE DIA.	2.0 INCHES
AVG. HAMMER DROP	30 INCHES
HAMMER WEIGHT	140 POUNDS

GRANULAR MATERIALS *

RELATIVE DENSITY	AUTOMATIC HAMMER SPT N-VALUE BLOWS/FOOT
VERY LOOSE	LESS THAN 3
LOOSE	3 - 8
MEDIUM	8 - 24
DENSE	24 - 40
VERY DENSE	GREATER THAN 40

SILTS AND CLAYS *

CONSISTENCY	AUTOMATIC HAMMER SPT N-VALUE BLOWS/FOOT
VERY SOFT	LESS THAN 1
SOFT	1 - 3
FIRM	3 - 6
STIFF	6 - 12
VERY STIFF	12 - 24
HARD	GREATER THAN 24

* FDOT SOILS AND FOUNDATIONS HANDBOOK 2016

NOTES

(1) BORINGS WERE DRILLED ON 01-06-2017 SPT BORINGS WERE PERFORMED USING A CME-45C AUTOMATIC HAMMER DRILLING RIG (ASTM D1586).

(2) AFTER COMPLETION OF DRILLING. BOREHOLES WERE BACKFILLED WITH GROUT.

(3) STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.

(4) GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.

(5) LATITUDE AND LONGITUDE COORDINATES WERE RECORDED BY RADISE USING A HAND GPS DEVICE.

REVISIONS							Names	Dates
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	K.A.	01/16/2017
						Checked by	A.B	01/16/2017
						Designed by		
						Checked by		
						Approved by		

RADISE (Infrastructure Engineers • Software Developers)
LICENSE NO. - 8901

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TEL 561-841-0103 FAX 561-841-0104
URL : http:// www.radise.net

CITY OF FORT LAUDERDALE		SCALE: VERTICAL N.T.S.	SHEET TITLE: SPT BORING SUBSURFACE PROFILES	SHEET NO. 3
COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: PUMP STATION D-10 AND D-11 FLOW ANALYSIS	RADISE PROJECT NO: 161206
BROWARD	TETRA TECH			

Table 1 : Summary of Laboratory test Results

Project Name: PS D-10 & D-11 Flow Analysis

Project ID: 161206

						ATTERBERG LIMITS		
Boring No	**Sample Depth**	**Soil Classification**	**Moisture Content (%)**	**Organic Content (%)**	**-200**	**LL (%)**	**PL (%)**	**PI**
B-1	4'-6'	CL	95.5	-	85.9	-	-	-
B-1	6'-8'	PT	470	64.0	-	-	-	-

Notes:

Moisture Content tested in accordance ASTM-D2216,
Organic Content tests are performed with furnace temperature @450 Celsius and tested accordance ASTM-D2974.

APPENDIX B

PERMITS OBTAINED BY OWNER

Environmental Protection and Growth Management Department
ENVIRONMENTAL ENGINEERING AND PERMITTING DIVISION
1 North University Drive, Mailbox 201, Plantation, Florida 33324 * 954-519-1483 * FAX 954-519-1412

LICENSE FOR INSTALLATION OF WASTEWATER COLLECTION/TRANSMISSION SYSTEM

APPLICANT:
City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

EPGMD LICENSE NO.: WW-62437
EXPIRATION DATE: 12/03/2022
DEP ID NO.: GTL #054569-638
SEC-TWP-RNG: 01-50-42
PROJECT: City of Fort Lauderdale LS D-10 Rehab

This license is issued under the provisions of Chapter 27 of the Broward County Code of Ordinances, hereinafter called the Code. 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. Commencement of construction under this license shall be deemed acceptance of all conditions specified in the license. License conditions shall also be deemed to be accepted if they are not objected to in writing and received by EPGMD within fourteen days of receipt of the license by the applicant.

The issuance of this license is a final agency determination. A person with a substantial interest may file a petition to request review of, or to intervene in a review of, a final administrative determination within 10 days of issuance of the license, subject to the provisions of Section 27-14 of the Code.

Your Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System has been evaluated. This General or Individual Permit is hereby issued pursuant to the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-4 and 62-604, Florida Administrative Code (F.A.C.).

GRAVITY SEWER: 72 LF of 8" PVC @ 0.40% Minimum Slope (2 Manholes)

FORCE MAIN: 10 LF of 6" DIP

LIFT STATION: One Duplex: 294 GPM @ 23.6' TDH

SUBJECT TO GENERAL CONDITIONS #1- #11 and SPECIFIC CONDITIONS # 1 - # 6.

In accordance with: Plans, Sheets C-01 thru C-05, C-07, C-07A, C-09 thru C-11, C-13 thru C-15, and E-01 thru E-13 (Received 08/23/2017 and Revised 11/07/2017). Tetra Tech. Project #: 12202. None Attached.

Located at: 97 ISLE OF VENICE, Fort Lauderdale 33301

Serving: Rehab of Existing Lift Station D-10. No New Flows.

Issued this 4th day of December, 2017.

Environmental Protection and Growth Management Department
Prepared by Yvel Rocher, P.E.

Yvel Rocher, P.E.
Domestic Wastewater Program

ec: FDEP/WPB
Asif Ali, PDMD Front Desk
Alan Dodd, Assistant Director of Public Works, City of Fort Lauderdale GT Lohmeyer WWTP
Janine M. Alexander, P.E., Tetra Tech

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and must be completed by the licensee and are enforceable by EPGMD pursuant to the Code. EPGMD will review this license periodically and may revoke or suspend the license, and 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, suspension, and/or enforcement action by EPGMD.

3. In the event the licensee is temporarily unable to comply with any of the conditions of the license or with the Code, the licensee shall notify EPGMD within eight (8) hours or as stated in the specific section of the Code. Within three (3) working days of the event, the licensee shall submit a written report to EPGMD that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention regarding the repair, replacement and reconstruction of destroyed facilities and a schedule of events leading toward operation with 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 violation of federal, state or local laws or regulations.

5. This license must be available for inspection on the 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 licensed facility or activity, that are submitted to the County, may be used by the County as evidence in any enforcement proceeding arising under the Code, except where such use is prohibited by Section 403.111, F.S.

7. The licensee agrees to comply and shall comply with all provisions of the most current version of the Code.

8. Any new owner or operator 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 be liable for any violation of the Code that results from the transferee's activities. The transferee shall comply with the transferor's original license conditions when the transferee has failed to obtain its own license.

9. The licensee, by acceptance of this license, specifically agrees to allow access and shall allow access to the licensed source, activity or facility at times to EPGMD personnel for the purposes of inspection and testing to determine compliance with this license and the Code.

10. This license does not constitute a waiver or approval of any other license, approval, or regulatory requirement by this or any other governmental agency that may be required.

11. Enforcement of the terms and provisions of this license shall be at the reasonable discretion of EPGMD, and any forbearance on behalf of EPGMD to exercise its rights hereunder in the event of any breach by the licensee, shall not be deemed or construed to be a waiver of EPGMD's rights hereunder.

SPECIFIC CONDITIONS:

1. This license is valid for construction of a sewage collection/transmission system and/or a reuse distribution system, or a WWTP modification only. All connections to the system must be approved by EPGMD prior to the issuance of a building permit.

2. Any deviation from approved plans and/or specifications affecting capacity, flow, or operation of components shall be submitted to and approved by the EPGMD before such changes are made.

3. The applicant shall be responsible for supplying as-built or record drawing(s) to EPGMD upon completion of the project. Such drawing(s) shall be signed and sealed by an Engineer registered in the State of Florida and be based on accurate records maintained by the Engineer or by a Land Surveyor currently registered in the State of Florida. Drawing(s) shall indicate locations and elevations of all pipe lines, manholes, pump stations and appurtenances installed under this project's license. Connection to the new system shall not be approved until the as-built (or record) drawing(s), certification documentation, and fees have been provided to and approved by EPGMD.

APPLICANT:
City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

EPGMD LICENSE NO.: WW-62437
EXPIRATION DATE: 12/03/2022
DEP ID NO.: GTL #054569-638
SEC-TWP-RNG: 01-50-42
PROJECT: City of Fort Lauderdale LS D-10 Rehab

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 or record drawings in an electronic format (PDF sent via email or a disc file). 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(8)(a), Part III (1) and (2) under 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 designation and emergency contact phone number(s).
6. NOTE: Future enforcement of violations may be minimized by recording all proper maintenance procedures.

Florida Department of Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, Florida 33406

CERTIFIED MAIL

In the Matter of an
Application for Permit by:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-638
EPGMD LICENSE:	WW-62437
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-10 Rehab
CONNECTED TO:	G T L

NOTICE OF PERMIT ISSUANCE

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 #054569-638

(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

Yvel Rocher, P.E.
Environmental Engineering and Permitting Division

Florida Department of Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, Florida 33406

State of Florida
Domestic Wastewater Collection/Transmission Individual Permit

PERMITTEE:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-638
EPGMD LICENSE:	WW-62437
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-10 Rehab
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:	GRAVITY SEWER:	72 LF of 8" PVC @ 0.40% Minimum Slope (2 Manholes)
	FORCE MAIN:	10 LF of 6" DIP
	LIFT STATION:	One Duplex: 294 GPM @ 23.6' TDH
TO SERVE:		Rehab of Existing Lift Station D-10. No New Flows.
LOCATION OF PROJECT:		97 ISLE OF VENICE, Fort Lauderdale 33301
IN ACCORDANCE WITH:		The limitations, requirements and other conditions set forth in this permit.

EPGMD License No. WW-62437 has also been issued for this project.

PERMITTEE:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-638
EPGMD LICENSE:	WW-62437
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-10 Rehab
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/legal/Rules/shared/62-4/62-4.pdf [62-4.160]

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 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/dom/dw-forms.htm [62-604.700(2)]

3. The new or modified collection/transmission facilities shall not be placed into service until EPGMD clears the project for use. [62.604.700(3)]

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 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)]

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]

PERMITTEE:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-638
EPGMD LICENSE:	WW-62437
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-10 Rehab
CONNECTED TO:	G T L

Executed in Plantation, Florida

BROWARD COUNTY
Environmental Protection and Growth Management Department

Yvel Rocher, P.E.

As delegated agent for:
State of Florida,
Department of Environmental Protection

DATE: 12/04/2017

Environmental Protection and Growth Management Department
ENVIRONMENTAL ENGINEERING AND PERMITTING DIVISION
1 North University Drive, Mailbox 201, Plantation, Florida 33324 * 954-519-1483 * FAX 954-519-1412

LICENSE FOR INSTALLATION OF WASTEWATER COLLECTION/TRANSMISSION SYSTEM

APPLICANT:
City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

EPGMD LICENSE NO.: WW-62438
EXPIRATION DATE: 12/03/2022
DEP ID NO.: GTL #054569-639
SEC-TWP-RNG: 11-50-42
PROJECT: City of Fort Lauderdale LS D-11 Rehab

This license is issued under the provisions of Chapter 27 of the Broward County Code of Ordinances, hereinafter called the Code. 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. Commencement of construction under this license shall be deemed acceptance of all conditions specified in the license. License conditions shall also be deemed to be accepted if they are not objected to in writing and received by EPGMD within fourteen days of receipt of the license by the applicant.

The issuance of this license is a final agency determination. A person with a substantial interest may file a petition to request review of, or to intervene in a review of, a final administrative determination within 10 days of issuance of the license, subject to the provisions of Section 27-14 of the Code.

Your Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System has been evaluated. This General or Individual Permit is hereby issued pursuant to the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-4 and 62-604, Florida Administrative Code (F.A.C.).

GRAVITY SEWER: 31 LF of 8" PVC @ 0.40% Minimum Slope (2 Manholes)

FORCE MAIN: 10 LF of 6" DIP

LIFT STATION: One Duplex: 288 GPM @ 27.3' TDH

SUBJECT TO GENERAL CONDITIONS #1- #11 and SPECIFIC CONDITIONS # 1 - # 6.

In accordance with: Plans, Sheets C-01 thru C-04, C-06, C-08, C-08A, C-09, C-10, C-12 thru C-15, and E-01 thru E-13 (Received 08/23/2017 and Revised 11/07/2017). Tetra Tech. Project #: 12202. None Attached.

Located at: 217 HENDRICKS ISLE, Fort Lauderdale 33301

Serving: Rehab of Existing Lift Station D-11. No New Flows.

Issued this 4th day of December, 2017.

Environmental Protection and Growth Management Department
Prepared by Yvel Rocher, P.E.

Yvel Rocher, P.E.
Domestic Wastewater Program

ec: FDEP/WPB
Asif Ali, PDMD Front Desk
Alan Dodd, Assistant Director of Public Works, City of Fort Lauderdale GT Lohmeyer WWTP
Janine M. Alexander, P.E., Tetra Tech

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and must be completed by the licensee and are enforceable by EPGMD pursuant to the Code. EPGMD will review this license periodically and may revoke or suspend the license, and 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, suspension, and/or enforcement action by EPGMD.

3. In the event the licensee is temporarily unable to comply with any of the conditions of the license or with the Code, the licensee shall notify EPGMD within eight (8) hours or as stated in the specific section of the Code. Within three (3) working days of the event, the licensee shall submit a written report to EPGMD that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention regarding the repair, replacement and reconstruction of destroyed facilities and a schedule of events leading toward operation with 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 violation of federal, state or local laws or regulations.

5. This license must be available for inspection on the 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 licensed facility or activity, that are submitted to the County, may be used by the County as evidence in any enforcement proceeding arising under the Code, except where such use is prohibited by Section 403.111, F.S.

7. The licensee agrees to comply and shall comply with all provisions of the most current version of the Code.

8. Any new owner or operator 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 be liable for any violation of the Code that results from the transferee's activities. The transferee shall comply with the transferor's original license conditions when the transferee has failed to obtain its own license.

9. The licensee, by acceptance of this license, specifically agrees to allow access and shall allow access to the licensed source, activity or facility at times to EPGMD personnel for the purposes of inspection and testing to determine compliance with this license and the Code.

10. This license does not constitute a waiver or approval of any other license, approval, or regulatory requirement by this or any other governmental agency that may be required.

11. Enforcement of the terms and provisions of this license shall be at the reasonable discretion of EPGMD, and any forbearance on behalf of EPGMD to exercise its rights hereunder in the event of any breach by the licensee, shall not be deemed or construed to be a waiver of EPGMD's rights hereunder.

SPECIFIC CONDITIONS:

1. This license is valid for construction of a sewage collection/transmission system and/or a reuse distribution system, or a WWTP modification only. All connections to the system must be approved by EPGMD prior to the issuance of a building permit.

2. Any deviation from approved plans and/or specifications affecting capacity, flow, or operation of components shall be submitted to and approved by the EPGMD before such changes are made.

3. The applicant shall be responsible for supplying as-built or record drawing(s) to EPGMD upon completion of the project. Such drawing(s) shall be signed and sealed by an Engineer registered in the State of Florida and be based on accurate records maintained by the Engineer or by a Land Surveyor currently registered in the State of Florida. Drawing(s) shall indicate locations and elevations of all pipe lines, manholes, pump stations and appurtenances installed under this project's license. Connection to the new system shall not be approved until the as-built (or record) drawing(s), certification documentation, and fees have been provided to and approved by EPGMD.

APPLICANT:
City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

EPGMD LICENSE NO.: WW-62438
EXPIRATION DATE: 12/03/2022
DEP ID NO.: GTL #054569-639
SEC-TWP-RNG: 11-50-42
PROJECT: City of Fort Lauderdale LS D-11 Rehab

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 or record drawings in an electronic format (PDF sent via email or a disc file). 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(8)(a), Part III (1) and (2) under 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 designation and emergency contact phone number(s).
6. NOTE: Future enforcement of violations may be minimized by recording all proper maintenance procedures.

Florida Department of Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, Florida 33406

CERTIFIED MAIL

In the Matter of an
Application for Permit by:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-639
EPGMD LICENSE:	WW-62438
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-11 Rehab
CONNECTED TO:	G T L

NOTICE OF PERMIT ISSUANCE

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 #054569-639

(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

Yvel Rocher, P.E.
Environmental Engineering and Permitting Division

Florida Department of Environmental Protection

Southeast District Office
3301 Gun Club Road, MSC 7210-1
West Palm Beach, Florida 33406

State of Florida
Domestic Wastewater Collection/Transmission Individual Permit

PERMITTEE:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-639
EPGMD LICENSE:	WW-62438
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-11 Rehab
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:	GRAVITY SEWER:	31 LF of 8" PVC @ 0.40% Minimum Slope (2 Manholes)
	FORCE MAIN:	10 LF of 6" DIP
	LIFT STATION:	One Duplex: 288 GPM @ 27.3' TDH
TO SERVE:		Rehab of Existing Lift Station D-11. No New Flows.
LOCATION OF PROJECT:		217 HENDRICKS ISLE, Fort Lauderdale 33301
IN ACCORDANCE WITH:		The limitations, requirements and other conditions set forth in this permit.

EPGMD License No. WW-62438 has also been issued for this project.

PERMITTEE:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-639
EPGMD LICENSE:	WW-62438
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-11 Rehab
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/legal/Rules/shared/62-4/62-4.pdf [62-4.160]

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 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/dom/dw-forms.htm [62-604.700(2)]

3. The new or modified collection/transmission facilities shall not be placed into service until EPGMD clears the project for use. [62.604.700(3)]

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 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)]

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]

PERMITTEE:

City of Fort Lauderdale
Attention: Daniel Rey, P.E., Project Manager II
100 N Andrews Ave
Fort Lauderdale, FL 33301

PERMIT NUMBER:	GTL #054569-639
EPGMD LICENSE:	WW-62438
ISSUANCE DATE:	12/04/2017
EXPIRATION DATE:	12/03/2022
COUNTY:	BROWARD
PROJECT:	City of Fort Lauderdale LS D-11 Rehab
CONNECTED TO:	G T L

Executed in Plantation, Florida

BROWARD COUNTY
Environmental Protection and Growth Management Department

Yvel Rocher, P.E.

As delegated agent for:
State of Florida,
Department of Environmental Protection

DATE: 12/04/2017

APPENDIX C

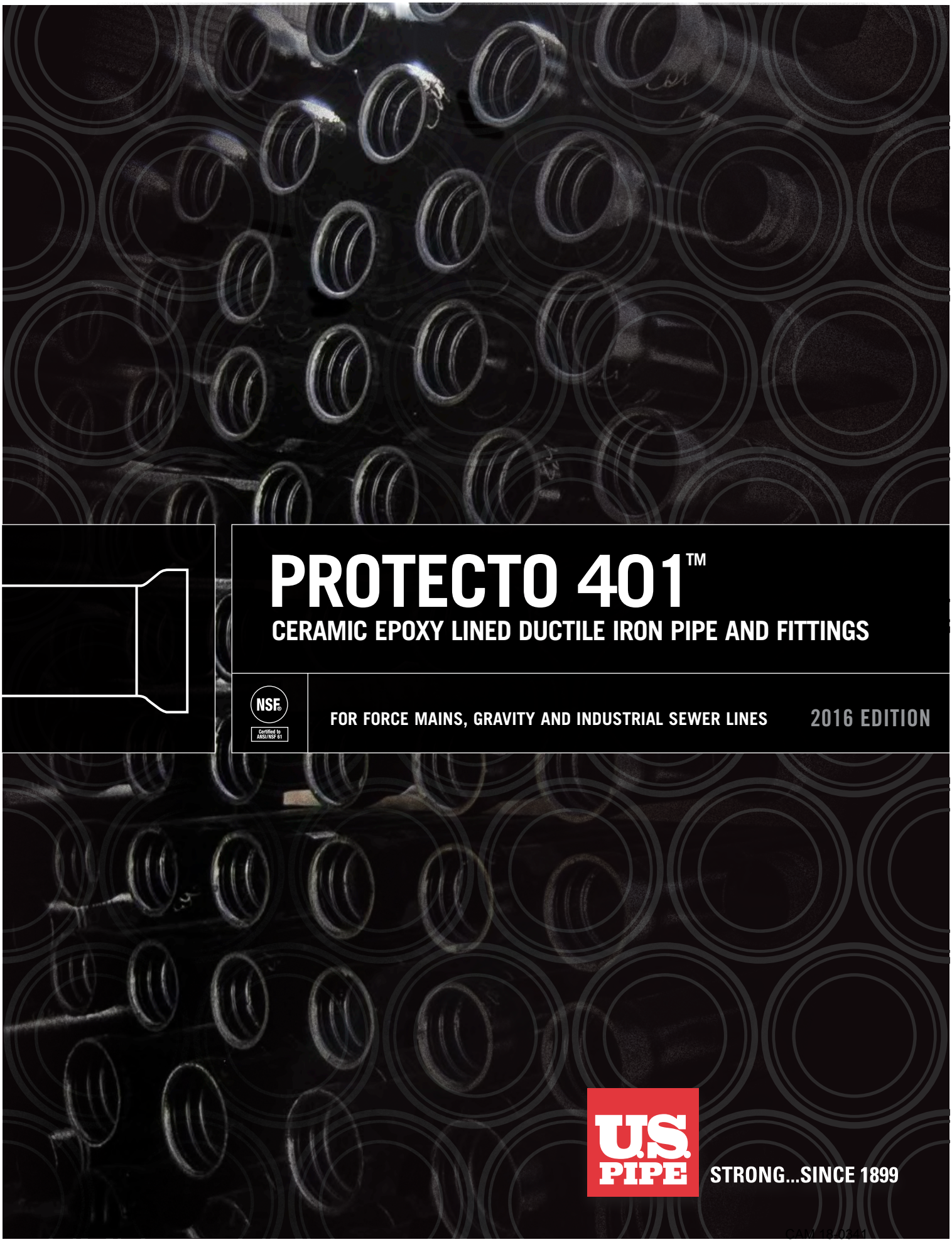
APPROVED MANUFACTURER'S LIST

APPROVED MANUFACTURERS LISTING			
		Wastewater	
Manufacturer		Model #	Comments
Air Release	ARI	D-020 SS	Combination
ARV Vault	US Foundry	7665 Sewer Lid	
Auto Blow Off	Hydro Guard	N/A	N/A
Casing End Seals	Advance Products	AC and AW	
	Cascade Water Works	CCES	
	CCI Pipeline	ESW/ESC	
	Power Seal	4810 ES	
Casing Spacer	Advance Products	S/12	
	Cascade Water Works	CCS	
	CCI Pipeline	CCS 12	
Fittings M/J	American	Class 350	P-401 Lined
	Sigma	Class 350	P-401 Lined
	Star	Class 350	P-401 Lined
	Tyler Union & Clow	Class 350	P-401 Lined
Flow Meter	Neptune	N/A	
Hydrants	Mueller	N/A	
DIP MJ Restraint	EBBA Iron Inc.	Series 1100	
	Uni-Flange	1400	
	Sigma	Series D	
	Star	Series 3000	
	Tyler Union	TufGrip Series TLD	
DIP Bell Joint Restraints	EBAA Iron Inc.	Series 1500 TD	
4"-12"	Uni-Flange	Series 1390	
	Sigma	Series PWP	
	Smith Blair	Series 165	
	Star	Series 3100	
DIP Bell Restraints 16"	EBAA Iron Inc.		
	Sigma		
	Star		
DIP Bell Restraint	American	Fast Grip Gasket	
	U. S. Pipe	Field lok 350 Gasket	
PVC Pipe MJ Restraints	EBBA Iron Inc.	Series 2000 PU	
	Uni-Flange	Series 1500	
	Sigma	Series SICE	
	Star	Series 4000	
	Tyler Union	Series TLP	
PVC Bell Joint	EBBA Iron Inc.	1500	
	Uni-Flange	Series 1390	
	Sigma	Series PWP	
	Smith Blair	Series 165	
	Star	Series 1100 C	
	Tyler Union	Tuff Grip 300 C	
PVC Bell Joint	Sigma	PV Lok PWP	
	Smith Blair	Series 165	
	Star	Series 1100 C	
PVC 900 DR18 Bell & Spigot	JM Eagle	C-900	Green
	Natl Pipe & Plastic Inc	C-900	Green
	N American Pipe Corp	C-900	Green
HDPE Drill	JM Eagle	HDPE	Green-DR11
	Performance Pipe	Driscoples 4300	Green-DR11
	Poly Pipe, Inc.	EHMW	Green-DR11
	CertainTeed	Certa-Lok C900/RJ	Green
DIP Pipe	American	P-401 Lined	Green
	U. S. Pipe	P-401 Lined	Green
Service Saddles	Ford	FC202	
	JCM	Series 406	
	Romac	202 NS	
	Smith Blair	317	
	Mueller	DR2S	
Service Saddles HDPE	Ford	FCP 202	SDR9-SDR 17
	Romac	Series 202 N-H	SDR9-SDR 17
	Smith Blair	Series 317-1 for HDPE	SDR9-SDR 17
Corporation Ball Stops	Ford	N/A	
	Mueller	N/A	
PE Tubing	Endot	IPS SDR9	Green
	Drisco	IPS SDR9	Green
	Charter Plastics	PE3408/3608 IPS SDR9	Green
Poly Service Clamp	Ford	FSC w/full wrap gskt	3" wide for CTS
	Smith Blair	244 full circle redi clp	3" wide for CTS

APPROVED MANUFACTURERS LISTING			
		Wastewater	
Manufacturer		Model #	Comments
Line Stops	JCM		Stainless Saddles
	Romac		Stainless Saddles
Tapping Sleeves	JCM	432 S. S.	
	Romac	SST	
Tapping Valves	American	American	
	Mueller	Mueller	
	Kennedy	Kennedy	
Check Valve	American	2100 Series	Rubber seal disc.
	Clow	159-02	14"-30"
	Clow	1106LW	2"-12"
Gate Valves	Mueller	N/A	
4" up	American	N/A	
	Clow	N/A	
	Kennedy	N/A	
Plug Valves	Dezurik	PEF	
	Val-Matic	Cam Centric	
	Clow		
	American		
Valve Box	Tyler Union	6850 Sewer	"SEWER" lid
	Mueller	10364 Sewer	"SEWER" lid
	Star	VB 001	"SEWER" lid
	Sigma	VB 261	"SEWER" lid
Pipe SDR 26 Gravity	JM Eagle	SDR26 Green	
	Natl Pipe & Plastics Inc	SDR26 Green	
	N. Am. Pipe Corp	SDR26 Green	
Fittings for SDR26	Harco	SDR26 Gasketed	
	JM Eagle	SDR26 Gasketed	
	Multi Fittings Corp	SDR26 Gasketed	
	Tigre USA, Inc	SDR26 Gasketed	
Manhole Lids	USF Fabrication, Inc	USF-170E	
Adjustment Rings	Ladtech, Inc	24R, 245	With rope sealant
	Conrete riser rings	2" thru 6" risers	Not over 18 " of
	Brick & Mortar	Brick & Mortar	Not over 18 " of
Precast Concrete	Allied	2 coat (8 mil each) coat tar epoxy interior/joints	
	Delzotto	"	"
	Dura Stress	"	"
	Hanson	"	"
	Mack	"	"
	Old Castle	"	"
Liners	GU liner	GU Liner	GU Barrel Liner
	AGRU liner	AGRU Liner	lines
Wetwell/Valve Box Hatches Coatings	Epoxytech-Euroflex		
Wetwell/Valve Box Concrete Coatings	Sewper Coat		
	Raven		
	Strong Seal		
Jointing Material		Ram-Nek	101/103
Hatches	Halliday Product	Aluminum Hatches	Wet well hatches
	US Fabrication	Aluminum Hatches	Wet well hatches
Tracing Wire	Main lines & Services	Green	6 GA
	Directional Drills	Copperhead	Green
Tracing Wire Splice	Wire Connection	6 GA wire nut	N/A
	Waterproofing Conn.	SA-102	Up to 3 - 10 GA wires
ID Marking	3" Metalic Tape	3" x 1000' Det. Tape	Force Main buried
Backflows	Watts	N/A	
	Febco	N/A	
	Ames	N/A	
	Wilkins	N/A	
PRV's	Clay		
	Bermad		
Liftstation Pumps	Flygt		
	Wilo-EMU		
	HOMA		

APPENDIX D

PROTECTO 401 PIPING AND FITTING COATING INFORMATION



PROTECTO 401™

CERAMIC EPOXY LINED DUCTILE IRON PIPE AND FITTINGS

NSF Certified to ANSI/NSF 61

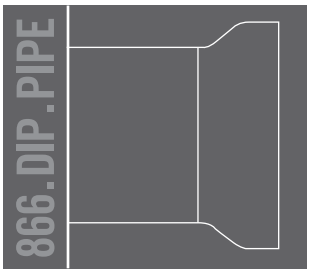
FOR FORCE MAINS, GRAVITY AND INDUSTRIAL SEWER LINES

2016 EDITION

U.S. PIPE

STRONG...SINCE 1899

CAM 19-0341



PROTECTO 401™

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PROTECTO 401™

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PROTECTO 401

Gray iron pipe preceded Ductile Iron pipe by well over 100 years. Its intended use was to convey water as well as wastewater. Continuous tests and field experience have brought the production and use of Ductile Iron pipe to maturity. It has replaced gray iron pipe in practically all applications. Ductile Iron is a high-strength, tough material used in water and sewer systems in all states within the U.S. and in many other areas of the world. Because of this inherent strength, U.S. Ductile Iron pipe is ideally suited to deep buries prevalent in gravity sewer systems. In addition to the elimination of infiltration/exfiltration, TR FLEX® Pipe and Fittings and FIELD LOK 350® Gaskets used with TYTON JOINT® Pipe will provide restraint to prevent joint separation.

U.S. Pipe's PROTECTO 401 Lined Ductile Iron Pipe and Fittings provide excellent protection and the strength necessary to do the job in tough sewer pipe applications. PROTECTO 401 has been successfully used in thousands of sanitary sewer applications and has been proven with both laboratory testing and two decades of actual sewer service on all sizes of Ductile Iron pipe and fittings.

PROTECTO 401 Ceramic Epoxy Lining was designed specifically for protection of Ductile Iron for sanitary sewer service by providing a reliability similar to cement mortar lining in drinking water service but having the excellent chemical resistance of a novalac epoxy for septic sewer service. Easily recognized brownish red bells and spigots, as well as stenciling showing "for sewer only", ensure that the correct lined pipe is used for sewer service. This concentration of design and formulation effort has resulted in a Ductile Iron pipe lining system with excellent durability, resistance to undercutting, and resistance to chemical attack.

PROTECTO 401 Ceramic Epoxy Lined Ductile Iron Pipe may be diametrically deflected up to 5% without damage to either the pipe or the lining

TR FLEX® & FIELD LOK 350® are Registered Trademarks of U.S. Pipe and Foundry Company.

866.DIP.PIPE

PROTECTO 401™

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PROTECTO 401 (CONT.)

PROTECTO 401 Has Been Tested and Withstood the Following:

Salt Spray

Two years with no undercutting on a scribed Ductile Iron panel when measured using ASTM B 117 and when rated using ASTM D 714 evaluating degrees of blistering.

20% Sulfuric Acid

Two years with no effect when rated using ASTM D 714 evaluating degree of blistering.

25% Sodium Hydroxide Immersion

At140ºF two years with no effect when rated using ASTM D 714 evaluating degree of blistering.

Distilled Water Immersion

At 160ºF two years with no effect when rated using ASTM D 714 evaluating degree of blistering.

Abrasion Resistance

Less than .075mm (3 mils) loss after one million cycles on a plus 22.5º to minus 22.5º sliding aggregate slurry abrasion tester using a sharp natural siliceous gravel with a particle size between 2 mm and 10 mm. This text conforms with European Standard EN598, Section 7.8.

PROTECTO 401 is also resistant to a wide range of oils, greases, solvents, detergents and fuels which may be introduced into a sewer line.

PROTECTO 401 is applied to the interior of Ductile Iron pipe and fittings utilizing specialized application equipment and a stringent specification. The lining is designed to be applied at a nominal 40 mils thickness. A non-destructive pinhole detection test and a thickness test are performed to ensure a sound, chemically resistant protective lining for U.S. Pipe's Ductile Iron pipe and fittings.

PROTECTO 401 is intended for use in domestic sanitary sewage lines. Chemical injection for odor control may damage pipe, gaskets and/or protective linings. Requests for individual recommendations for industrial sewer applications of PROTECTO 401 Lined Pipe and Fittings should be made to a U.S. Pipe Sales Representative.

866.DIP.PIPE

PROTECTO 401™

NSF Certified to ANSI/NSF 61

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SUGGESTED SPECIFICATION FOR PROTECTO 401 INTERIOR LINING FOR DUCTILE IRON PIPE AND FITTINGS

I. Condition of Ductile Iron Prior to Surface Preparation

All Ductile Iron pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because complete removal of old linings may not be possible, the intent of this specification is that the entire interior of the Ductile Iron pipe and fittings shall not have been lined with any substance prior to the application of the specified lining material and no coating shall have been applied to the first six inches of the exterior of the spigot ends.

II. Lining Material

The standard of quality is PROTECTO 401 Ceramic Epoxy. The material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties and a certification of the test results.

A. A permeability rating of 0.00 when tested according to the procedure described in Method A of ASTME 96, Procedure A with a test duration of 30 days.

B. The following tests must be run on coupons from factory-lined Ductile Iron pipe.

1. ASTM B 117 Salt Spray (scribed panel)
Results to equal 0.0 undercutting after two years.

2. ASTM G 95 Cathodic Disbondment (1.5 volts at 77ºF)
Results to equal no more than 0.5 mm undercutting after 30 days.

3. Immersion Testing
Rated using ASTM D 714.

a. 20% Sulfuric Acid
No effect after two years.

b. 140ºF 25% Sodium Hydroxide
No effect after two years.

c. 160ºF Distilled Water (scribed panel)
No effect after two years.

d. 120ºF Tap Water (scribed panel)
0.0 undercutting after two years with no effect.

C. Abrasion Resistance

Less than .075 mm (3 mils) loss after one million cycles on a ±22.5º sliding aggregate slurry abrasion tester using a sharp natural siliceous gravel with a particle size between 2 mm and 10 mm (European Standandard SN598).

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SUGGESTED SPECIFICATION FOR PROTECTO 401 INTERIOR LINING FOR DUCTILE IRON PIPE AND FITTINGS (CONT.)

III. Application

A. Applicator

The lining shall be applied by a certified firm with a successful history of applying linings to the interior of Ductile Iron pipe and fittings.

B. Surface Preparation

Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil or grease is present, or any substance which can be removed by solvent, shall be solvent cleaned to remove these substances. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive material. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering oxide may be left on the surface. Any area where rust reappears before lining must be reblasted.

C. Lining

After surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness of PROTECTO 401. No lining shall be applied when the substrate or ambient temperature is below 40°F. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

D. Coating of Bell Sockets and Spigot Ends

Due to the tolerances involved, bell interior and spigot exterior up to 6 inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum PROTECTO Joint Compound. The Joint Compound shall be applied by brush to ensure coverage. Care should be taken that the Joint Compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the linings.

E. Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.

F. Touch-Up & Repair

PROTECTO Joint Compound shall be used for touch-up or repair in accordance with manufacturer's recommendations.

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2016 EDITION P 7

SUGGESTED SPECIFICATION FOR PROTECTO 401 INTERIOR LINING FOR DUCTILE IRON PIPE AND FITTINGS (CONT.)

G. High Pressure Cleaning

Guidelines for Pressure Cleaning the Internal Diameter of Ductile Iron Pipe

The Ductile Iron Pipe Research Association (and its Member Companies), Federal Signal Corporation (and its subsidiaries Vactor, Elgin, Guzzler, Jetstream & Ravo), and Induron Coatings Inc. participated in a pressure cleaning research program that was conducted by the Missouri University of Science and Technology – High Pressure Waterjet Laboratory.

The test program included asphaltic seal coated cement-mortar lined and Protecto 401 lined Ductile Iron pipe which resulted in guidelines for the pressure cleaning of the inside diameters of Ductile Iron pipe. Through a collaborative effort with the organizations above and the City of Moline, Illinois, field tests were conducted and the guidelines verified as effective and safe for cement-mortar and Protecto 401 lined ductile iron pipe.

Guidelines are as follows:

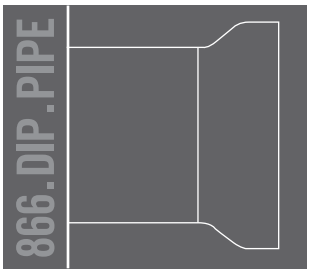
1. The nozzle shall be configured with fan jets only (no round jets).
2. The fan jets should be oriented at a maximum angle of 30 degrees to the pipe wall.
3. The nozzle shall be a minimum of 2 inches standoff from the pipe surface.
4. The nozzle assembly shall be self-rotating and incorporate a rotational control mechanism - target speed of 30 rpm.
5. The water pressure at the nozzles shall be no more than 1,800 psi.
6. The nozzle assembly shall have non-abrasive wheels and/or UHMW (ultra-high molecular weight) polyethylene skids positioned so that at no time does the nozzle assembly contact the lining of the pipe.
7. The nozzle assembly shall continually move when pressure washing with no hesitation in the pipe.
8. All hose couplings, hoses, etc. shall be smooth so as to facilitate movement across the pipe joints without creating damage to the lining.

Pipe diameters of 24-inch and larger may require additional passes for effective cleaning.

Vactor Blue Twister Nozzle (or equal) and appropriate assembly

Although research shows no significant damage in testing, the decision to pressure wash, if made by the customer, engineer, or installer, may present some risk of damage to the Protecto 401.

Any such risk is dependent on water pressure, speed, jet design and angle to the lining, distance of the jet from the lining, type of lining, and other factors. DIPRA does not warrant or guarantee the result or assume any risk associated with pressure washing.



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2016 EDITION P 8

SUGGESTED SPECIFICATION FOR PROTECTO 401 INTERIOR LINING FOR DUCTILE IRON PIPE AND FITTINGS (CONT.)

IV. Inspection And Certification

A. Inspection

1. All Ductile Iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC PA-2 Film Thickness Rating.
2. The interior lining of all pipe and barrels and fittings shall be tested for pinholes with a nondestructive 2,500 volt test. Any defects found shall be repaired prior to shipment.
3. Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

B. Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification and that the material used was as specified.

C. Handling

PROTECTO 401 Lined Pipe and Fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning or laying.

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2016 EDITION P 9

PROCEDURES FOR SEALING AND REPAIRING

Procedures for Sealing Cut Ends and Repairing Field Damaged Areas of PROTECTO 401 Lined Pipe and Fittings

1. Remove burrs caused by field cutting of ends or handling damage and smooth out the edge of the lining if rough.

2. Remove all traces of oil, grease, asphalt, dust, dirt, etc.

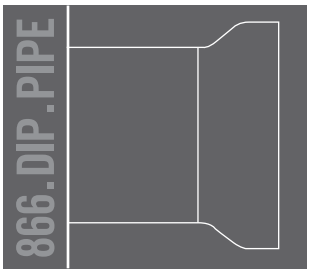
3. Remove any damaged lining caused by field-cutting operations or handling and clean any exposed metal by sanding or scraping. Sandblasting or power tool cleaning roughening is also acceptable. It is recommended that any loose lining be removed by chiseling, cutting or scraping into well-adhered lined area before patching. Be sure to overlap at least one inch of lining in the area to be repaired.

4. With the area to be sealed or repaired absolutely clean and suitably roughened, apply a coat of PROTECTO Joint Compound using the following procedure.

   a. **Mixing Procedure** — The repair kit for PROTECTO 401 contains two small cans of PROTECTO Joint Compound. PROTECTO Joint Compound is a two-component epoxy and the contents of the small container shall be mixed with the contents of the large container. If less than the full contents of each can is to be mixed, the material may be mixed using the mixing ratio printed on the labels. After Part B is added to Part A, the mixture shall be thoroughly agitated. All activated material must be used within one hour of mixing.

   b. **Application of Material** — After the material has been thoroughly mixed, it can be applied to the prepared surface by brush. Brushing is usually best due to the fact that most of the areas to be repaired are small. It is recommended that the patch material not completely cover the roughened area. This permits a field inspector to verify that proper surface preparation was performed before application of the patching material. Practices conducive to a good coating are contained in the technical data sheet for PROTECTO Joint Compound.

5. It is important to coat the entire freshly cut exposed metal surface of the cut pipe end. To ensure proper sealing, overlap at least one inch of the lining with this repair material.



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2016 EDITION P 10

TECHNICAL DATA

Description

A brushable novalac epoxy designed for sealing cut ends and repairs when pipe are lined with PROTECTO 401 Ceramic Epoxy.

Limitations

This material should be used on spigots and in bell sockets only after the pipe or fitting is lined with PROTECTO 401 Ceramic Epoxy. PROTECTO Joint Compound can be used over PROTECTO 401 or on bare substrate.

NOTE: *Do not apply PROTECTO 401 over PROTECTO Joint Compound*

Surface Preparation

The surface preparation shall be equal to the specifications for the project or as outlined in the touch-up procedure. Do not apply PROTECTO Joint Compound over wet or frozen surfaces. Dry Film Thickness: As outlined in specifications.

Application Data

Brush, roll or airless spray. Thin or clean up with Methyl Ethyl Ketone.

Physical Data

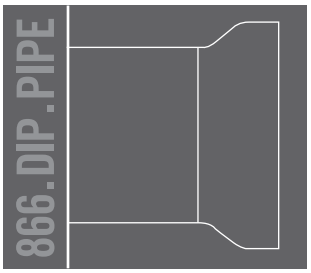
Volatile Organic Contents: <1.40 lbs per gallon mixed unthinned.

Safety Data

See individual product label for safety and health data information. Individual Material Safety Data Sheets are available upon request.

Assembly Precautions

Pipe using FIELD LOK 350® Gaskets must never be pushed; nor should pipe be homed all the way to the Bell Shoulder with FIELD LOK 350® Gaskets. Pushing or pulling Ductile Iron pipe lined with PROTECTO 401 using any other technique may damage the lining.



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PRODUCTS FOR WATER, WASTEWATER AND FIRE PROTECTION

DUCTILE IRON PIPE	SIZE RANGE
TYTON JOINT® Pipe	3"-64" Ductile Iron
Mechanical Joint Pipe	3"-24" Ductile Iron
TR FLEX® Pipe	4"-36" Ductile Iron
HP LOK® Pipe	30"-64" Ductile Iron
Flanged Pipe	3"-64" Ductile Iron
Grooved Pipe	4"-36" Ductile Iron
USIFLEX® Boltless Ball Joint Pipe For Subaqueous Installations	4"-48" Ductile Iron
RESTRAINED JOINTS	
TR FLEX® Restrained Joint	4"-36" Ductile Iron
HP LOK® Restrained Joint	30"-64" Ductile Iron
MJ FIELD LOK® Gaskets	4"-12", 16"
FIELD LOK 350® Gaskets	4"-24"
TR FLEX GRIPPER® Rings	4"-36" Ductile Iron
TR TELE FLEX® Assemblies	4"-24" Ductile Iron
FITTINGS	
TYTON® Fittings	14"-24" Ductile Iron
TRIM TYTON® Fittings	4”-12” Ductile Iron
TR FLEX® Fittings	4"-36" Ductile Iron
TR FLEX® Telescoping Sleeves	4"-24" Ductile Iron
HP LOK® Fittings and HP LOK® Telescoping Sleeves	30"-64" Ductile Iron
Mechanical Joint Fittings	3"-48" Ductile Iron
Flanged Fittings	2"-64" Ductile Iron
XTRA FLEX® Couplings	4"-24" Ductile Iron
MISCELLANEOUS PRODUCTS	
PROTECTO 401™ Lined Ductile Iron Pipe for Domestic Sewage and Industrial Wastes	4"-64" Ductile Iron
GLASS Lined Ductile Iron Pipe for Wastewater Treatment Plants	4”-30” Ductile Iron
RING FLANGE-TYTE® Gaskets	4"-36"
FULL FACE FLANGE-TYTE® Gaskets	4"-64"
MJ Harness-Lok	4"-48" Ductile Iron
Saddle Outlets	Various Ductile Iron
Welded Outlets	Various Ductile Iron
Polyethylene Encasement	4"-64"

Our products are manufactured in conformance with National Standards so that our customers may be assured of getting the performance and longevity they expect. Use of accessories or other appurtenances that do not comply with recognized standards may jeopardize the performance and longevity of the project.

TWO CHASE CORPORATE DRIVE
SUITE 200
BIRMINGHAM, AL 35244

866.DIP.PIPE (866.347.7473)

INFO@USPIPE.COM
WWW.USPIPE.COM

U.S. PIPE

STRONG...SINCE 1899

Revised 1-16

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.

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:	

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:

Address of Firm:

Telephone Number:

Name of Person Completing Form:

Title:

Signature:

Date:

City Project Number:

City Project Description:

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

☐ Number of Employees in your firm

--Percent (%) Women

--Percent (%) Minorities

--Job Classifications of Women and Minorities

☐ Use of minority and/or women subcontractors on past projects.

☐ Nature of the work subcontracted to minority and/or women-owned firms.

☐ How are subcontractors notified of available opportunities with your firm?

☐ Anticipated amount to be subcontracted on this project.

☐ Anticipated amount to be subcontracted to minority and/or women-owned businesses on this project.

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? Include the year, description, and contract value.

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, telephone numbers and e-mail addresses). Include the project name, year, description, and contract value.

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: Engineering Contractor's License #

(County/State)

Expiration Date:

NOTE: To be considered for award of this contract, the bidder must submit a financial statement upon request.

NOTE: Contractor must have proper licensing and shall provide copy of same with his proposal.

QUESTIONNAIRE SHEET

1. Have you personally inspected the proposed work and have you a complete plan for its performance?

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?

4. What equipment will you purchase for the proposed work?

5. What equipment will you rent for the proposed work?

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.			$	$
B.			$	$
C.			$	$
D.			$	$

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:

CONTRACTOR'S CERTIFICATE OF COMPLIANCE WITH NON-DISCRIMINATION PROVISIONS OF THE CONTRACT

The completed and signed form should be returned with the Contractor's submittal. If not provided with submittal, the Contractor must submit within three business days of City's request. Contractor may be deemed non-responsive for failure to fully comply within stated timeframes.

Pursuant to City Ordinance Sec. 2-17(a)(i)(ii), bidders must certify compliance with the Non-Discrimination provision of the ordinance.

(a) Contractors doing business with the City shall not discriminate against their employees based on the employee's race, color, religion, gender (including identity or expression), marital status, sexual orientation, national origin, age, disability or any other protected classification as defined by applicable law.

Contracts. Every Contract exceeding $100,000, or otherwise exempt from this section shall contain language that obligates the Contractor to comply with the applicable provisions of this section.

The Contract shall include provisions for the following:

(i) The Contractor certifies and represents that it will comply with this section during the entire term of the contract.

(ii) The failure of the Contractor to comply with this section shall be deemed to be a material breach of the contract, entitling the City to pursue any remedy stated below or any remedy provided under applicable law.

Authorized Signature

Print Name and Title

Date

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.

Name	**Title**	**Name**	**Title**
Name	**Title**	**Name**	**Name**

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

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 BIDSYNC 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 bodder'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:

CITY OF FORT LAUDERDALE
GENERAL CONDITIONS

These instructions are standard for all contracts for commodities or services issued through the City of Fort Lauderdale Procurement Services Division. The City may delete, supersede, or modify any of these standard instructions for a particular contract by indicating such change in the Invitation to Bid (ITB) Special Conditions, Technical Specifications, Instructions, Proposal Pages, Addenda, and Legal Advertisement. In this general conditions document, Invitation to Bid (ITB), Request for Qualifications (RFQ), and Request for Proposal (RFP) are interchangeable.

PART I BIDDER PROPOSAL PAGE(S) CONDITIONS:

1.01 BIDDER ADDRESS: The City maintains automated vendor address lists that have been generated for each specific Commodity Class item through our bid issuing service, BidSync. Notices of Invitations to Bid (ITB'S) are sent by e-mail to the selection of bidders who have fully registered with BidSync or faxed (if applicable) to every vendor on those lists, who may then view the bid documents online. Bidders who have been informed of a bid's availability in any other manner are responsible for registering with BidSync in order to view the bid documents. There is no fee for doing so. If you wish bid notifications be provided to another e-mail address or fax, please contact BidSync. If you wish purchase orders sent to a different address, please so indicate in your bid response. If you wish payments sent to a different address, please so indicate on your invoice.

1.02 DELIVERY: Time will be of the essence for any orders placed as a result of this ITB. The City reserves the right to cancel any orders, or part thereof, without obligation if delivery is not made in accordance with the schedule specified by the Bidder and accepted by the City.

1.03 PACKING SLIPS: It will be the responsibility **of** the awarded Contractor, to attach all packing slips to the OUTSIDE of each shipment. Packing slips must provide a detailed description of what is to be received and reference the City of Fort Lauderdale purchase order number that is associated with the shipment. Failure to provide a detailed packing slip attached to the outside of shipment may result in refusal of shipment at Contractor's expense.

1.04 PAYMENT TERMS AND CASH DISCOUNTS: Payment terms, unless otherwise stated in this ITB, will be considered to be net 45 days after the date of satisfactory delivery at the place of acceptance and receipt of correct invoice at the office specified, whichever occurs last. Bidder may offer cash discounts for prompt payment but they will not be considered in determination of award. If a Bidder offers a discount, it is understood that the discount time will be computed from the date of satisfactory delivery, at the place of acceptance, and receipt of correct invoice, at the office specified, whichever occurs last.

1.05 TOTAL BID DISCOUNT: If Bidder offers a discount for award of all items listed in the bid, such discount shall be deducted from the total of the firm net unit prices bid and shall be considered in tabulation and award of bid.

1.06 BIDS FIRM FOR ACCEPTANCE: Bidder warrants, by virtue of bidding, that the bid and the prices quoted in the bid will be firm for acceptance by the City for a period of one hundred twenty (120) days from the date of bid opening unless otherwise stated in the ITB.

1.07 VARIANCES: For purposes of bid evaluation, Bidder's must indicate any variances, no matter how slight, from ITB General Conditions, Special Conditions, Specifications or Addenda in the space provided in the ITB. No variations or exceptions by a Bidder will be considered or deemed a part of the bid submitted unless such variances or exceptions are listed in the bid and referenced in the space provided on the bidder proposal pages. If variances are not stated, or referenced as required, it will be assumed that the product or service fully complies with the City's terms, conditions, and specifications.

By receiving a bid, City does not necessarily accept any variances contained in the bid. All variances submitted are subject to review and approval by the City. If any bid contains material variances that, in the City's sole opinion, make that bid conditional in nature, the City reserves the right to reject the bid or part of the bid that is declared, by the City as conditional.

1.08 NO BIDS: If you do not intend to bid please indicate the reason, such as insufficient time to respond, do not offer product or service, unable to meet specifications, schedule would not permit, or any other reason, in the space provided in this ITB. Failure to bid or return no bid comments prior to the bid due and opening date and time, indicated in this ITB, may result in your firm being deleted from our Bidder's registration list for the Commodity Class Item requested in this ITB.

1.09 MINORITY AND WOMEN BUSINESS ENTERPRISE PARTICIPATION AND BUSINESS DEFINITIONS: 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.

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 51 percent of which is owned by females or, in the case of a publicly owned business, at least 51 percent 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, which includes persons having origins in any of the Black racial groups of Africa.
WHITE, which includes persons whose origins are Anglo-Saxon and Europeans and persons of Indo-European decent including Pakistani and East Indian.
HISPANIC, which includes persons of Mexican, Puerto Rican, Cuban, Central and South American, or other Spanish culture or origin, regardless of race.
NATIVE AMERICAN, which includes persons whose origins are American Indians, Eskimos, Aleuts, or Native Hawaiians.
ASIAN AMERICAN, which includes persons having origin in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.

1.10 MINORITY-WOMEN BUSINESS ENTERPRISE PARTICIPATION

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. Proposers are requested to include in their proposals a narrative describing their past accomplishments and intended actions in this area. If proposers are considering minority or women owned enterprise participation in their proposal, those firms, and their specific duties have to be identified in the proposal. If a proposer is considered for award, he or she will be asked to meet with City staff so that the intended MBE/WBE participation can be formalized and included in the subsequent contract.

1.11 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. 2013), with regard to the "Cuba Amendment," 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 or the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2017), that it is not engaged in a boycott of Israel, and that it does not have business operations in Cuba or Syria, as provided in section 287.135, Florida Statutes (2017), as may be amended or revised. The City may terminate this Agreement 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 (2017), 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 the Scrutinized Companies that Boycott Israel List created pursuant to Section 215.4725, Florida Statutes (2017), or is engaged in a boycott of Israel or has been engaged in business operations in Cuba or Syria, as defined in Section 287.135, Florida Statutes (2017), as may be amended or revised.

1.12 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.

Part II DEFINITIONS/ORDER OF PRECEDENCE:

2.01 BIDDING DEFINITIONS The City will use the following definitions in its general conditions, special conditions, technical specifications, instructions to bidders, addenda and any other document used in the bidding process:

INVITATION TO BID (ITB) when the City is requesting bids from qualified Bidders.
REQUEST FOR PROPOSALS (RFP) when the City is requesting proposals from qualified Proposers.
REQUEST FOR QUALIFICATIONS (RFQ) when the City is requesting qualifications from qualified Proposers.
BID – a price and terms quote received in response to an ITB.
PROPOSAL – a proposal received in response to an RFP.
BIDDER – Person or firm submitting a Bid.
PROPOSER – Person or firm submitting a Proposal.
RESPONSIVE BIDDER – A person whose bid conforms in all material respects to the terms and conditions included in the ITB.
RESPONSIBLE BIDDER – A person who has the capability in all respects to perform in full the contract requirements, as stated in the ITB, and the integrity and reliability that will assure good faith performance.
FIRST RANKED PROPOSER – That Proposer, responding to a City RFP, whose Proposal is deemed by the City, the most

advantageous to the City after applying the evaluation criteria contained in the RFP.
SELLER – Successful Bidder or Proposer who is awarded a Purchase Order or Contract to provide goods or services to the City.
CONTRACTOR – Successful Bidder or Proposer who is awarded a Purchase Order, award Contract, Blanket Purchase Order agreement, or Term Contract to provide goods or services to the City.
CONTRACT – A deliberate verbal or written agreement between two or more competent parties to perform or not to perform a certain act or acts, including all types of agreements, regardless of what they may be called, for the procurement or disposal of equipment, materials, supplies, services or construction.
CONSULTANT – Successful Bidder or Proposer who is awarded a contract to provide professional services to the City.
The following terms may be used interchangeably by the City: ITB and/or RFP; Bid or Proposal; Bidder, Proposer, or Seller; Contractor or Consultant; Contract, Award, Agreement or Purchase Order.

2.02 SPECIAL CONDITIONS: Any and all Special Conditions contained in this ITB that may be in variance or conflict with these General Conditions shall have precedence over these General Conditions. If no changes or deletions to General Conditions are made in the Special Conditions, then the General Conditions shall prevail in their entirety,

PART III BIDDING AND AWARD PROCEDURES:

3.01 SUBMISSION AND RECEIPT OF BIDS: To receive consideration, bids must be received prior to the bid opening date and time. Unless otherwise specified, Bidders should use the proposal forms provided by the City. These forms may be duplicated, but failure to use the forms may cause the bid to be rejected. Any erasures or corrections on the bid must be made in ink and initialed by Bidder in ink. All information submitted by the Bidder shall be printed, typewritten or filled in with pen and ink. Bids shall be signed in ink. Separate bids must be submitted for each ITB issued by the City in separate sealed envelopes properly marked. When a particular ITB or RFP requires multiple copies of bids or proposals they may be included in a single envelope or package properly sealed and identified. Only send bids via facsimile transmission (FAX) if the ITB specifically states that bids sent via FAX will be considered. If such a statement is not included in the ITB, bids sent via FAX will be rejected. Bids will be publicly opened in the Procurement Office, or other designated area, in the presence of Bidders, the public, and City staff. Bidders and the public are invited and encouraged to attend bid openings. Bids will be tabulated and made available for review by Bidder's and the public in accordance with applicable regulations.

3.02 MODEL NUMBER CORRECTIONS: If the model number for the make specified in this ITB is incorrect, or no longer available and replaced with an updated model with new specifications, the Bidder shall enter the correct model number on the bidder proposal page. In the case of an updated model with new specifications, Bidder shall provide adequate information to allow the City to determine if the model bid meets the City's requirements.

3.03 PRICES QUOTED: Deduct trade discounts, and quote firm net prices. Give both unit price and extended total. 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.

3.04 TAXES: The City of Fort Lauderdale is exempt from Federal Excise and Florida Sales taxes on direct purchase of tangible property. Exemption **number for EIN is 59-6000319, and State Sales tax exemption number is 85-8013875578C-1.**

3.05 WARRANTIES OF USAGE: Any quantities listed in this ITB as estimated or projected are provided for tabulation and information purposes only. No warranty or guarantee of quantities is given or implied. It is understood that the Contractor will furnish the City's needs as they arise.

3.06 APPROVED EQUAL: When the technical specifications call for a brand name, manufacturer, make, model, or vendor catalog number with acceptance of APPROVED EQUAL, it shall be for the purpose of establishing a level of quality and features desired and acceptable to the City. In such cases, the City will be receptive to any unit that would be considered by qualified City personnel as an approved equal. In that the specified make and model represent a level of quality and features desired by the City, the Bidder must state clearly in the bid any variance from those specifications. It is the Bidder's responsibility to provide adequate information, in the bid, to enable the City to ensure that the bid meets the required criteria. If adequate information is not submitted with the bid, it may be rejected. The City will be the sole judge in determining if the item bid qualifies as an approved equal.

3.07 MINIMUM AND MANDATORY TECHNICAL SPECIFICATIONS: The technical specifications may include items that are considered minimum, mandatory, or required. If any Bidder is unable to meet or exceed these items, and feels that the technical specifications are overly restrictive, the bidder must notify the Procurement Services Division immediately. Such notification must be received by the Procurement Services Division prior to the deadline contained in the ITB, for questions of a material nature, or prior to five (5) days before bid due and open date, whichever occurs first. If no such notification is received prior to that deadline, the City will consider the technical specifications to be acceptable to all bidders.

3.08 MISTAKES: Bidders are cautioned to examine all terms, conditions, specifications, drawings, exhibits, addenda, delivery instructions and special conditions pertaining to the ITB. Failure of the Bidder to examine all pertinent documents shall not entitle the bidder to any relief from the conditions imposed in the contract.

3.09 SAMPLES AND DEMONSTRATIONS: Samples or inspection of product may be requested to determine suitability. Unless otherwise specified in Special Conditions, samples shall be requested after the date of bid opening, and if requested should be received by the City within seven (7) working days of request. Samples, when requested, must be furnished free of expense to the City and if not used in testing or destroyed, will upon request of the Bidder, be returned within thirty (30) days of bid award at Bidder's expense. When required, the City may request full demonstrations of units prior to award. When such demonstrations are requested, the Bidder shall respond promptly and arrange a demonstration at a convenient location. Failure to provide samples or demonstrations as specified by the City may result in rejection of a bid.

3.10 LIFE CYCLE COSTING: If so specified in the ITB, the City may elect to evaluate equipment proposed on the basis of total cost of ownership. In using Life Cycle Costing, factors such as the following may be considered: estimated useful life, maintenance costs, cost of supplies, labor intensity, energy usage, environmental impact, and residual value. The City reserves the right to use those or other applicable criteria, in its sole opinion that will most accurately estimate total cost of use and ownership.

3.11 BIDDING ITEMS WITH RECYCLED CONTENT: In addressing environmental concerns, the City of Fort Lauderdale encourages Bidders to submit bids or alternate bids containing items with recycled content. When submitting bids containing items with recycled content, Bidder shall provide documentation adequate for the City to verify the recycled content. The City prefers packaging consisting of materials that are degradable or able to be recycled. When specifically stated in the ITB, the City may give preference to bids containing items manufactured with recycled material or packaging that is able to be recycled.

3.12 USE OF OTHER GOVERNMENTAL CONTRACTS: The City reserves the right to reject any part or all of any bids received and utilize other available governmental contracts, if such action is in its best interest.

3.13 QUALIFICATIONS/INSPECTION: Bids will only be considered from firms normally engaged in providing the types of commodities/services specified herein. The City reserves the right to inspect the Bidder's facilities, equipment, personnel, and organization at any time, or to take any other action necessary to determine Bidder's ability to perform. The Procurement Director reserves the right to reject bids where evidence or evaluation is determined to indicate inability to perform.

3.14 BID SURETY: If Special Conditions require a bid security, it shall be submitted in the amount stated. A bid security can be in the form of a bid bond or cashier's check. Bid security will be returned to the unsuccessful bidders as soon as practicable after opening of bids. Bid security will be returned to the successful bidder after acceptance of the performance bond, if required; acceptance of insurance coverage, if required; and full execution of contract documents, if required; or conditions as stated in Special Conditions.

3.15 **PUBLIC RECORDS/TRADE SECRETS/COPYRIGHT:** The Proposer's response to the RFP is a public record pursuant to Florida law, which is subject to disclosure by the City under the State of Florida Public Records Law, Florida Statutes Chapter 119.07 ("Public Records Law"). The City shall permit public access to all documents, papers, letters or other material submitted in connection with this RFP and the Contract to be executed for this RFP, subject to the provisions of Chapter 119.07 of the Florida Statutes.

Any language contained in the Proposer's response to the RFP purporting to require confidentiality of any portion of the Proposer's response to the RFP, except to the extent that certain information is in the City's opinion a Trade Secret pursuant to Florida law, shall be void. If a Proposer submits any documents or other information to the City which the Proposer claims is Trade Secret information and exempt from Florida Statutes Chapter 119.07 ("Public Records Laws"), the Proposer shall clearly designate that it is a Trade Secret and that it is asserting that the document or information is exempt. The Proposer must specifically identify the exemption being claimed under Florida Statutes 119.07. The City shall be the final arbiter of whether any information contained in the Proposer's response to the RFP constitutes a Trade Secret. The city's determination of whether an exemption applies shall be final, and the proposer agrees to defend, indemnify, and hold harmless the city and the city's officers, employees, and agent, against any loss or damages incurred by any person or entity as a result of the city's treatment of records as public records. Proposals purporting to be subject to copyright protection in full or in part will be rejected.

EXCEPT FOR CLEARLY MARKED PORTIONS THAT ARE BONA FIDE TRADE SECRETS PURSUANT TO FLORIDA LAW, DO NOT MARK YOUR RESPONSE TO THE RFP AS PROPRIETARY OR CONFIDENTIAL. DO NOT MARK YOUR RESPONSE TO THE RFP OR ANY PART THEREOF AS COPYRIGHTED.

3.16 PROHIBITION OF INTEREST: No contract will be awarded to a bidding firm who has City elected officials, officers or employees affiliated with it, unless the bidding firm has fully complied with current Florida State Statutes and City Ordinances relating to this issue. Bidders must disclose any such affiliation. Failure to disclose any such affiliation will result in disqualification of the Bidder and removal of the Bidder from the City's bidder lists and prohibition from engaging in any business with the City.

3.17 RESERVATIONS 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.

If the ITB provides for a contract trial period, the City reserves the right, in the event the selected bidder does not perform satisfactorily, to award a trial period to the next ranked bidder or to award a contract to the next ranked bidder, if that bidder has successfully provided services to the City in the past. This procedure to continue until a bidder is selected or the contract is re-bid, at the sole option of the City.

3.18 LEGAL REQUIREMENTS: Applicable provisions of all federal, state, county laws, and local ordinances, rules and regulations, shall govern development, submittal and evaluation of all bids received in response hereto and shall govern any and all claims and disputes which may arise between person(s) submitting a bid response hereto and the City by and through its officers, employees and authorized representatives, or any other person, natural or otherwise; and lack of knowledge by any bidder shall not constitute a cognizable defense against the legal effect thereof.

3.19 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 DIRECTOR OF PROCUREMENT SERVICES DIVISION (DIRECTOR), BY DELIVERING A LETTER OF PROTEST TO THE DIRECTOR WITHIN FIVE (5) DAYS AFTER A NOTICE OF INTENT TO AWARD IS POSTED ON THE CITY'S WEB SITE AT THE FOLLOWING LINK: http://www.fortlauderdale.gov/purchasing/notices_of_intent.htm

THE COMPLETE PROTEST ORDINANCE MAY BE FOUND ON THE CITY'S WEB SITE AT THE FOLLOWING LINK: http://www.fortlauderdale.gov/purchasing/protestordinance.pdf

PART IV BONDS AND INSURANCE

4.01 PERFORMANCE BOND: If a performance bond is required in Special Conditions, the Contractor shall within fifteen (15) working days after notification of award, furnish to the City a Performance Bond, payable to the City of Fort Lauderdale, Florida, in the face amount specified in Special Conditions as surety for faithful performance under the terms and conditions of the contract. If the bond is on an annual coverage basis, renewal for each succeeding year shall be submitted to the City thirty (30) days prior to the termination date of the existing Performance Bond. The Performance Bond must be executed by a surety company of recognized standing, authorized to do business in the State of Florida and having a resident agent.

Acknowledgement and agreement is given by both parties that the amount herein set for the Performance Bond is not intended to be nor shall be deemed to be in the nature of liquidated damages nor is it intended to limit the liability of the Contractor to the City in the event of a material breach of this Agreement by the Contractor.

4.02 INSURANCE: If the Contractor is required to go on to City property to perform work or services as a result of ITB award, the Contractor shall assume full responsibility and expense to obtain all necessary insurance as required by City or specified in Special Conditions.

The Contractor shall provide to the Procurement Services Division original certificates of coverage and receive notification of approval of those certificates by the City's Risk Manager prior to engaging in any activities under this contract. The Contractors insurance is subject to the approval of the City's Risk Manager. The certificates must list the City as an ADDITIONAL INSURED for General Liability Insurance, and shall have no less than thirty (30) days written notice of cancellation or material change. Further modification of the insurance requirements may be made at the sole discretion of the City's Risk Manager if circumstances change or adequate protection of the City is not presented. Bidder, by submitting the bid, agrees to abide by such modifications.

PART V PURCHASE ORDER AND CONTRACT TERMS:

5.01 COMPLIANCE TO SPECIFICATIONS, LATE DELIVERIES/PENALTIES: Items offered may be tested for compliance to bid specifications. Items delivered which do not conform to bid specifications may be rejected and returned at Contractor's expense. Any violation resulting in contract termination for cause or delivery of items not conforming to specifications, or late delivery may also result in:

- Bidders name being removed from the City's bidder's mailing list for a specified period and Bidder will not be recommended for any award during that period.
- All City Departments being advised to refrain from doing business with the Bidder.
- All other remedies in law or equity.

5.02 ACCEPTANCE, CONDITION, AND PACKAGING: The material delivered in response to ITB award shall remain the property of the Seller until a physical inspection is made and the material accepted to the satisfaction of the City. The material must comply fully with the terms of the ITB, be of the required quality, new, and the latest model. All containers shall be suitable for

storage and shipment by common carrier, and all prices shall include standard commercial packaging. The City will not accept substitutes of any kind. Any substitutes or material not meeting specifications will be returned at the Bidder's expense. Payment will be made only after City receipt and acceptance of materials or services.

5.03 SAFETY STANDARDS: All manufactured items and fabricated assemblies shall comply with applicable requirements of the Occupation Safety and Health Act of 1970 as amended, and be in compliance with Chapter 442, Florida Statutes. Any toxic substance listed in Section 38F-41.03 of the Florida Administrative Code delivered as a result of this order must be accompanied by a completed Safety Data Sheet (SDS).

5.04 ASBESTOS STATEMENT: All material supplied must be 100% asbestos free. Bidder, by virtue of bidding, certifies that if awarded any portion of the ITB the bidder will supply only material or equipment that is 100% asbestos free.

5.05 OTHER GOVERNMENTAL ENTITIES: If the Bidder is awarded a contract as a result of this ITB, the bidder may, if the bidder has sufficient capacity or quantities available, provide to other governmental agencies, so requesting, the products or services awarded in accordance with the terms and conditions of the ITB and resulting contract. Prices shall be F.O.B. delivered to the requesting agency.

5.06 VERBAL INSTRUCTIONS PROCEDURE: No negotiations, decisions, or actions shall be initiated or executed by the Contractor as a result of any discussions with any City employee. Only those communications which are in writing from an authorized City representative may be considered. Only written communications from Contractors, which are assigned by a person designated as authorized to bind the Contractor, will be recognized by the City as duly authorized expressions on behalf of Contractors.

5.07 INDEPENDENT CONTRACTOR: The Contractor is an independent contractor under this Agreement. Personal services provided by the Proposer shall be by employees of the Contractor and subject to supervision by the Contractor, and not as officers, employees, or agents of the City. Personnel policies, tax responsibilities, social security, health insurance, employee benefits, procurement policies unless otherwise stated in this ITB, and other similar administrative procedures applicable to services rendered under this contract shall be those of the Contractor.

5.08 INDEMNITY/HOLD HARMLESS AGREEMENT: The Contractor agrees to protect, defend, indemnify, and hold harmless the City of Fort Lauderdale and its officers, employees and agents from and against any and all losses, penalties, damages, settlements, claims, costs, charges for other expenses, or liabilities of every and any kind including attorney's fees, in connection with or arising directly or indirectly out of the work agreed to or performed by Contractor under the terms of any agreement that may arise due to the bidding process. Without limiting the foregoing, any and all such claims, suits, or other actions relating to personal injury, death, damage to property, defects in materials or workmanship, actual or alleged violations of any applicable Statute, ordinance, administrative order, rule or regulation, or decree of any court shall be included in the indemnity hereunder.

5.09 TERMINATION FOR CAUSE: If, through any cause, the Contractor shall fail to fulfill in a timely and proper manner its obligations under this Agreement, or if the Contractor shall violate any of the provisions of this Agreement, the City may upon written notice to the Contractor terminate the right of the Contractor to proceed under this Agreement, or with such part or parts of the Agreement as to which there has been default, and may hold the Contractor liable for any damages caused to the City by reason of such default and termination. In the event of such termination, any completed services performed by the Contractor under this Agreement shall, at the option of the City, become the City's property and the Contractor shall be entitled to receive equitable compensation for any work completed to the satisfaction of the City. The Contractor, however, shall not be relieved of liability to the City for damages sustained by the City by reason of any breach of the Agreement by the Contractor, and the City may withhold any payments to the Contractor for the purpose of setoff until such time as the amount of damages due to the City from the Contractor can be determined.

5.10 TERMINATION FOR CONVENIENCE: The City reserves the right, in its best interest as determined by the City, to cancel contract by giving written notice to the Contractor thirty (30) days prior to the effective date of such cancellation.

5.11 CANCELLATION FOR UNAPPROPRIATED FUNDS: The obligation of the City for payment to a Contractor is limited to the availability of funds appropriated in a current fiscal period, and continuation of the contract into a subsequent fiscal period is subject to appropriation of funds, unless otherwise authorized by law.

5.12 RECORDS/AUDIT: The Contractor shall maintain during the term of the contract all books of account, reports and records in accordance with generally accepted accounting practices and standards for records directly related to this contract. The Contractor agrees to make available to the City Auditor or designee, during normal business hours and in Broward, Miami-Dade or Palm Beach Counties, all books of account, reports and records relating to this contract should be retained for the duration of the contract and for three years after the final payment under this Agreement, or until all pending audits, investigations or litigation matters relating to the contract are closed, whichever is later.

5.13 PERMITS, TAXES, LICENSES: The successful Contractor shall, at their own expense, obtain all necessary permits, pay all licenses, fees and taxes, required to comply with all local ordinances, state and federal laws, rules and regulations applicable to business to be carried out under this contract.

5.14 LAWS/ORDINANCES: The Contractor shall observe and comply with all Federal, state, local and municipal laws, ordinances

rules and regulations that would apply to this contract.

5.15 NON-DISCRIMINATION: There shall be no discrimination as to race, sex, color, creed, age or national origin in the operations conducted under this contract.

5.16 UNUSUAL CIRCUMSTANCES: If during a contract term where costs to the City are to remain firm or adjustments are restricted by a percentage or CPI cap, unusual circumstances that could not have been foreseen by either party of the contract occur, and those circumstances significantly affect the Contractor's cost in providing the required prior items or services, then the Contractor may request adjustments to the costs to the City to reflect the changed circumstances. The circumstances must be beyond the control of the Contractor, and the requested adjustments must be fully documented. The City may, after examination, refuse to accept the adjusted costs if they are not properly documented, increases are considered to be excessive, or decreases are considered to be insufficient. In the event the City does not wish to accept the adjusted costs and the matter cannot be resolved to the satisfaction of the City, the City will reserve the following options:

1. The contract can be canceled by the City upon giving thirty (30) days written notice to the Contractor with no penalty to the City or Contractor. The Contractor shall fill all City requirements submitted to the Contractor until the termination date contained in the notice.

2. The City requires the Contractor to continue to provide the items and services at the firm fixed (non-adjusted) cost until the termination of the contract term then in effect.

3. If the City, in its interest and in its sole opinion, determines that the Contractor in a capricious manner attempted to use this section of the contract to relieve them of a legitimate obligation under the contract, and no unusual circumstances had occurred, the City reserves the right to take any and all action under law or equity. Such action shall include, but not be limited to, declaring the Contractor in default and disqualifying him for receiving any business from the City for a stated period of time.

If the City does agree to adjusted costs, these adjusted costs shall not be invoiced to the City until the Contractor receives notice in writing signed by a person authorized to bind the City in such matters.

5.17 ELIGIBILITY: If applicable, the Contractor must first register with the Department of State of the State of Florida, in accordance with Florida State Statutes, prior to entering into a contract with the City.

5.18 PATENTS AND ROYALTIES: The Contractor, without exception, shall indemnify and save harmless the City and its employees from liability of any nature and kind, including cost and expenses for or on account of any copyrighted, patented or un-patented invention, process, or article manufactured or used in the performance of the contract, including its use by the City. If the Contractor uses any design, device, or materials covered by letters, patent or copyright, it is mutually agreed and understood without exception that the bid prices shall include all royalties or costs arising from the use of such design, device, or materials in any way involved in the work.

5.19 ASSIGNMENT: Contractor shall not transfer or assign the performance required by this ITB without the prior written consent of the City. Any award issued pursuant to this ITB, and the monies, which may become due hereunder, are not assignable except with the prior written approval of the City Commission or the City Manager or City Manager's designee, depending on original award approval.

5.20 LITIGATION VENUE: The parties waive the privilege of venue and agree that all litigation between them in the state courts shall take place in Broward County, Florida and that all litigation between them in the federal courts shall take place in the Southern District in and for the State of Florida.

5.21 LOCATION OF UNDERGROUND FACILITIES: If the Contractor, 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 Contractor, shall be deemed non-responsive to this solicitation.

5.22 PUBLIC RECORDS

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT. CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT: (954-828-5002, PRRCONTRACT@FORTLAUDERDALE.GOV, CITY CLERK'S OFFICE, 100 NORTH ANDREWS AVENUE, FORT LAUDERDALE, FLORIDA 33301)

Contractor shall:

1. Keep and maintain public records that ordinarily and necessarily would be required by the City in order to perform the service.

2. Upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes (2017), as may be amended or revised, or as otherwise provided by law.

3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of this contract if the Contractor does not transfer the records to the City.

4. Upon completion of the Contract, transfer, at no cost, to the City all public records in possession of the Contractor or keep and maintain public records required by the City to perform the service. If the Contractor transfers all public records to the City upon completion of this Contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of this Contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City, upon request from the City's custodian of public records, in a format that is compatible with the information technology systems of the City.

Question and Answers for Bid #12105-283 - Pump Stations D-10 & D-11 Flow Analysis and Redesign

Overall Bid Questions

There are no questions associated with this bid.

Question Deadline: Feb 1, 2018 5:00:00 PM EST